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T: ARNOLD of Northampton

ON THE

EDUCATION OF THE DEAF.

A MANUAL FOR TEACHERS.

REVISED AND RE-WRITTEN BY

A. FARRAR, F.G.S.

APPROVED BY THE
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PREFACE.

The original edition of Arnold's *Education of Deaf-Mutes; A Manual for Teachers,* published by the College of Teachers of the Deaf in 1888, having become exhausted, I was invited by the Committee of that body to undertake the publication of a new and revised edition of that work, a task which I have felt it my duty to accept and carry out to the best of my power.

The original work undoubtedly met a pressing want, created partly by the examinations of the above and other Colleges, and partly by the felt want of some systematic exposition of the special methods, especially the oral, of educating the deaf. While thus proving its value, it was obvious from both a technical and literary point of view, that it had many and grave defects which seriously militated against its utility either as a text book or as a work of reference. There is now no need to particularize these defects; suffice it to say that the entire work has been subjected to a thorough revision, with the result, as I venture to hope, that its utility in this new edition has been thereby increased, as well as by (1) a better division and arrangement of the contents, so as to facilitate study and reference, (2) abridging or re-writing such parts as were considered to require it, and (3) eliminating superfluous or irrelevant matter, and in some cases substituting what is likely to prove more useful.

It may be advisable to state in more detail what has accordingly been done.

Book I. has been entirely re-written after comparison in most instances with the original authorities, and brought down to a recent date—Arnold's account not coming down later than the Abbé de l'Epée. But nothing more than a mere sketch has been attempted, although the intermediate period (Chap. II.) has been treated somewhat more fully than the others.

Book II. has for the most part been re-arranged and re-written, Arnold's own words, however, being retained as far as possible, and some new matter has been either added or substituted for the old.

In Book III., Chap. I. has been abridged and re-written. In Chap. II. the sections on the Organs of Respiration and of Speech have been carefully revised, and that on the Ear entirely re-written by Dr. Jones (to whom I shall again refer). In Chap. III., with the exception of the section on Lip-reading, which has been amplified, nothing beyond simple revision has been attempted, besides some improvements in detail, such as, to name one instance, the diacritic marks. Certain reservations in regard to the section on the Elements of Speech and Lip-reading will be found in the proper place.

Book IV. has simply been revised and where necessary abridged. This is perhaps, as Arnold in his preface hinted, the weakest part of the work. Little or no exception can be taken to it as an exposition of the *principles* of teaching language to the deaf, but undoubtedly their practical application would be better illustrated by a properly graduated series of lessons. To have done this would, however, have involved writing an entirely new book, and not having the requisite experience, I have not attempted it. Apart from the absence of a graduated sequence, this book will, I think, prove intelligible enough to answer the purpose its author had in view.

The reader who is new to the subject will become aware that in no department of education are there so many conflicting theories and methods as in that of teaching the deaf—a diversity due not so much to the inherent difficulties of the work as to the want of an accurate knowledge of the natural laws and conditions on which must depend the successful education of the deaf for the world in which they have to live. Happily, the utility of speech and lip-reading for all who are capable of profiting by them to a reasonable degree is no longer seriously disputed ; such differences of opinion as exist resolve themselves into the question whether or not other modes of expression should be associated with speech in the school course, and if so, to what extent they may be legitimately employed.

The last quarter of the last century has witnessed a great and gratifying progress not only in the instruction of the deaf in speech, but also in their education exclusively or chiefly by its means. This has, however, not been without its drawbacks in tending to exaggerated views of the possibilities of speech and lip-reading, as seen in some of the more extreme developments of the oral method, and in extravagant but unwarranted expectations of its results, which have brought about the inevitable reaction. Practice in this, as in other matters, does not and can never quite answer the requirements of theory. But I am convinced, on a rational view of the whole matter, that as the ordinary results of the oral method have stood the test of over three centuries, and are admitted as valid and sufficient by unprejudiced observers, they will survive the injudicious exaggerations of a passing phase of the general movement now in progress in favour of speech methods of educating the deaf. At the same time Arnold's statement in his preface that " there would be only one method did we thoroughly understand their state," would not now be endorsed by the best and most experienced teachers. A large number, in fact a majority, of the deaf can be orally taught with reasonable success, if not in every case quite "restored to society," but the rest have admittedly to be taught by other methods more suited to their capacity and natural peculiarities.

The standpoint of this work, then, is the *oral method* for as many of the deaf as initial experience proves can benefit more or less by it, and any other for those who clearly cannot, with a preference, as far as possible, for the employment of *verbal* forms of language. It need hardly be added that the exclusion of all except natural signs—and these only to a strictly limited extent, in fact, in the oral method at the beginning only—is regarded as all-important. Such a position I believe to be in conformity with Arnold's original aims. The question of the use of the manual alphabet by oral teachers is one that I prefer to leave open, merely observing that it would, as a rule, be best to exclude it wherever speech suffices between the teacher and his pupils.

As the education of the deaf is practically the ordinary education of hearing children specialized in certain directions, the principles of general education are as applicable in the one case as in the other. The reader is therefore assumed to have a competent knowledge of Educational Psychology. There are numerous works now published on this subject, but I would recommend Sully's *Teacher's Handbook of Psychology* (4th edition) as being amply sufficient for the purpose.

I desire to express my acknowledgments to the Library Committee of the National Association of Teachers of the Deaf for placing the resources of the Arnold Library at my disposal; to H. N. Dixon, Esq., M.A., F.L.S., of Northampton, for revising the original drawings from which the plates in the former edition were prepared, as well as for their use in the present edition, and especially for his friendly offices in securing the services of the late Arthur H. Jones, Esq., M.D., M.R.C.P., of the same town, in dealing with certain portions in the manner already indicated; and to the ladies and gentlemen who have furnished information on matters in which they were personally interested. Nor must I omit to add how much indebted I am to Dr. Jones for the care and attention he gave to his work, in which he took a more than professional interest and practically completed before his death.

For myself I must beg the kind indulgence of the reader for any defects or shortcomings that a work which makes no claim to be complete or perfect must inevitably exhibit, and may plead in extenuation that the task was unsought, and that I have not the experience of a practical teacher, although against this I think I may fairly set off the educated experience of one of the very class for whose ultimate advantage this work is intended, as well as a general interest in all questions relating to their education.

I desire to state, in conclusion, that although this work has been prepared at the request, and with the full approval, of the College, I alone am responsible for its production.

A. FARRAR, Jr.

April, 1901.

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Book I.

HISTORICAL SKETCH.

CHAPTER I.—General View of the Condition of the Deaf in Early Times.

THE history of the art of educating the deaf does not properly begin until the sixteenth century, for previous to this we have no record, save in a few unimportant cases, of any attempt to educate them. Before giving an account of the earliest teachers, it will be necessary, in order properly to appreciate the difficulties and prejudices with which they were confronted, briefly to review the condition of the deaf before and during their time. This, however, is not easy, as of direct evidence we have little or none. But we can infer what the condition of the deaf was, partly from the general state of the times, and partly from opinion based on the teaching of those philosophers, physicians, divines, and jurists whose authority was admitted in all matters within their respective spheres.

Natural Philosophers and Physicians. Hippocrates (fifth century B.C.), the great Greek physician, instances the experience of the naturally deaf as a proof that speech, to be intelligible, depends on a proper action of the tongue. The authority of Aristotle (fourth century B.C.), the great Greek natural philosopher, was for centuries sovereign, and it was increased when his system was bound up with that of the Christian Church. We therefore find in the early accounts of the deaf that the writers refer to his *dicta* on the question of their capacity for instruction, and this generally to their prejudice. He taught that all who were deaf from birth were necessarily dumb, but only as an observed natural fact. Pliny in the first century wrote to the same effect. Aristotle also says that while hearing is the most efficient instrument (or sense) of education, this is only contingently, since hearing is the sense of sound, and sound the vehicle of thought; hence the blind are more intelligent than deaf-mutes. As Aristotle elsewhere refers to a common principle of hearing and speech, it is not clear whether he and Pliny sufficiently understood the relation of speech to hearing to perceive that dumbness is not an organic lesion, but an accidental consequent of deafness. But, however that may be, their words were, by a strained interpretation, usually alleged as proving that the deaf were incapable of learning speech or of intellectual instruction, since speech was a natural and not an acquired art.

Mediæval physicians, following Galen, the celebrated Latin physician of the second century, assumed that there was a physical relation, arising from a common cerebral origin, between the hearing and the organs of speech, and that a lesion of this was the only cause why one born deaf was also dumb. Even when the deaf had actually been taught to speak, they tried to explain the fact in every but the right way.

Hence popular opinion regarded those as naturally dumb, who were naturally deaf, and those as dumb *ex accidente*, who, after having spoken, ceased to do so from subsequent deafness. It was considered impossible that the former could ever speak or even write, and if any such did learn to speak, they were regarded as having been originally dumb *ex accidente* only.

Roman and Mediæval Law The decisions of the ancient jurists as to the rights of the deaf were necessarily based as much on the current opinion of their incapacity for instruction as on the observed facts of their condition. Dumbness was technically looked upon as *morbosus.* Roman law, until Justinian (sixth century), recognized only those who were deaf but not dumb, or dumb but not deaf, probably from a scrupulous regard for the rights of such; leaving those who were both deaf and dumb to be by that fact included in the category of those deprived of intelligence. Justinian, in dividing the deaf into the five following classes, probably reduced to writing current views :—

1. The deaf and dumb, with whom the double infirmity is natural. 2. The deaf and dumb, with whom the double infirmity is not natural, but the effect of causes occurring since birth. 3. The deaf who are not dumb, but whose deafness is natural. 4. Those who are simply deaf, from causes occurring since birth. 5. Those who are simply dumb, either naturally or adventitiously.

We need not here consider the last three classes, which are obscure ; and only remark that those of the second class who became deaf, and consequently dumb, in infancy, would in practice be included in the first. In regard to the first class, then, we find it enacted in Justinian's Code that they were to have guardians appointed for them, as not being able to direct their own affairs ; that they were prohibited from making a will, manumitting, contracting, constituting a donation *mortis causa*, and being witnesses. But in regard to the second class, it was enacted that if they had acquired a knowledge of letters, they could exercise all these rights by writing. The deaf and the dumb could marry and become subject to dotal obligations.

These laws do not permit us to assume that education had done anything for the naturally, *i.e.*, congenitally, deaf, or those who became so in infancy.

The Code of Justinian was followed by the later Latin nations ; and the feudal laws, independently of it, made similar prohibitions, the deaf not being permitted the enjoyment of fiefs and of feudal privileges. So sharp was the distinction drawn between the congenitally deaf and those who became so subsequent to birth, and so absolute was the exclusion of the former from civil rights, that when Ponce de Leon's pupil, *born* deaf and dumb, had been educated to speak and act as an intelligent being, great ingenuity had to be exercised to explain away the old law, by which he was excluded from the rights of primogeniture to which he was otherwise entitled.

The Church. Beyond the injunction in the Mosaic Law not to "curse" the deaf, and the fact that in the time of our Lord dumbness was attributed to demoniacal possession, the Scriptures throw no light on their condition. But the Rabbis were more explicit. In the book *Chagigah*, in the Talmud, the deaf and dumb are classed with "a fool and a child," as not being responsible for their actions, and were exempt from the ordinances of the Law. But those either deaf or dumb only were treated as capable persons, and not wholly exempt from legal obligations.

The views of the Christian Church were also adverse to the capacity of the deaf for instruction. St. Augustine, through a strained interpretation of the Apostle's words, "faith cometh by hearing," considered them as excluded from the blessings of religious knowledge, because it could only be given and received by hearing. In this he was followed by subsequent theologians. The deaf were, not, however, precluded from marrying by signs, as the ceremony was a mere form.

It is now tolerably clear, that it was considered impossible in fact as well as in legal theory that the congenitally deaf could by any means attain to speak, or were, as Molinæus, a French jurist of the sixteenth century, said, capable of education. It was believed that speech was a natural instinct, and not an acquired art, and being the only recognized medium of education, its absence implied the exclusion of the deaf from intellectual instruction. The possibility of there being other avenues to the mind was hardly so much as admitted. Even writing was held to depend on speech. Language, reason, and speech were a triad, each member of which was practically inseparable from the others. To be *deaf* or *dumb* was, in fact, synonymous with lack of intelligence, and in most languages the words had that etymological connotation, which long survived in the colloquial forms—*dumbie* and *dummy*.

Hence it will be also clear why there never was any question of educating the deaf by that form of expression so characteristic of them—natural signs. The jurists admitted these as valid in certain circumstances, but there is no evidence, nor is it probable, that they were ever developed or considered capable of serving any higher purpose than the practical necessities of life demanded ; at most they were simply a *pis aller*. It is also very significant, that the possibility of employing in the instruction of the deaf the manual alphabets known to be so freely used by some of the Monastic orders under a vow of silence, was not contemplated by their inventors. They were evidently considered simply as interpreters of spoken thought. Such facts are not surprising in the light of the belief in the interdependence of language and speech to the exclusion of other modes of expression, and explain why the earliest efforts at the rational education of the deaf were directed to enabling them *to speak*.

Instances can, however, be adduced of some, such as St. Francis de Sales, who rose above the prejudices of their times in their treatment of the deaf, and of some of the deaf, such as the famous painter Navarette, *El Mudo,* who succeeded in surmounting the difficulties of their condition. Such cases, however, are exceptional enough to prove the general neglect in which the deaf as a class were left.

Jerome Cardan (1501-1576). Cardan was an Italian, famous as a mathematician and physician, and one of the most interesting personages connected with the revival of science in Europe. There was scarcely a branch of knowledge which did not come within his ken, and although none of his discoveries were epoch making, his work, crude as much of it was, embodied the soundest learning of his time, and foreshadowed the subsequent course of science. Amongst other subjects, he associated the study of psychology with that of physiology, especially in regard to the organs of the senses and their functions. In one of his works, *Paralipomenon*, he discusses the subject with special reference to the deaf, saying that "Agricola relates in his *De inventione dialectica* [published 1538] that he had seen a man born deaf and dumb, who had learnt to read and write, so that he could express whatever he wished. Thus it is possible to place a deaf-mute in a position to hear by reading, and to speak by writing; for his memory leads him to understand, by reflection, that *bread*, as written, signifies the thing which is eaten. He thus reads, by the light of his reason, as it were in a picture; for by this means, though nothing is referred to sounds, not only objects, but actions and results are made known. And just as after seeing a picture, we may draw another picture, guided simply by a conception of the objects represented, such is also the case with letters. For as different sounds are conventionally used to signify different things, so also may the various figures of objects and words."

The significance of this passage cannot be overestimated, for it shattered once for all the long established notion that the hearing of sounds is a necessary condition of the association of words with the ideas or things signified, and established the theoretical principle on which the possibility of teaching the deaf is founded. Elsewhere Cardan, who for practical purposes classed those who became deaf after birth, but before they had the chance to speak, with the congenitally deaf, urges the importance of teaching them to read and write, and states that many, even recondite, ideas can be explained by signs. It does not appear that Cardan ever put his ideas to a practical application, but he sowed the seed, and as his works had in their time a great vogue, it probably bore fruit.

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CHAPTER II.—EARLY TEACHERS AND AUTHORS.

St. John of Beverley (d 721). We must take a leap backwards of some hundreds of years to mention an incident related by Bede in his *Ecclesiastical History.* John was Bishop of Hexham before his translation to York. During his residence at the former town, he was in the habit of retiring on certain occasions with a few disciples to a place in the neighbourhood for prayer and reading. At such times he used to have some sorely afflicted person with him that he might minister to his wants. One of these was a deaf and dumb youth, in whom the bishop long took a paternal interest. On one occasion, John, in the words of Bede, "ordered him to thrust forth his tongue, and show it to him. Then, taking hold of him by the chin, he made the sign of the cross on his tongue. This done, he told him to draw it back again, and to speak. 'Say some word; say Yea.' . . . . . Immediately his tongue was loosed, and he said what he had been ordered. The bishop then added the names of the letters, 'say A'; he said A: 'say B'; he said this, too. And when he had repeated the names of the letters as the bishop said them one by one, the latter proceeded further, and gave him syllables and words to say; and when, in all these instances, he at once replied, he told him to say longer sentences, and he did so. Nor did he, through the whole of that day and the following night . . . . . cease saying something, and revealing to others the secret of his mind as he never could before."

Stripped of the miraculous character attributed to it then and for long afterwards, we have good reason to see in this incident the earliest instance of a simple attempt to teach a deaf-mute to speak, but which we need not suppose took so short a time as that mentioned. The story, however, is of too vague and isolated a kind to justify the extravagant claim made by some, that John was the first teacher—oral or otherwise—of the deaf.

Pedro Ponce de Leon (1520?—1584). A scion of the noble house of Arcos, Ponce de Leon is said to have been a native of Valladolid. He was educated at the famous University of Salamanca, and then joining the Benedictines, passed the greater part of his life at their monastery of S. Salvador at Oña, near Burgos. He was undoubtedly the first regular instructor of the deaf, and his success is well attested not only by his own words in a legal document of the year 1578, but also by contemporary accounts. In the former he says—"In this house of Oña, I have had for my pupils, who were deaf and dumb from birth, sons of great lords and of notable people, whom I have taught to speak, read, write, and reckon; to pray, to assist at the Mass, to know the doctrines of Christianity, and to know how to confess themselves by speech; some of them also to learn Latin, and some both Latin and Greek, and to understand the Italian language; and one was ordained, and held office and emolument in the Church, and performed the service of the Canonic Hours"; and more to the same effect, from which, adds Ponce de Leon, "Aristotle excluded them."

The first of the contemporary accounts we have is in manuscript, and is by the licentiate Lasso, written at Oña in 1550. It chiefly deals with the legal questions which had been raised by what was then regarded as the wonderful success of Ponce de Leon in the oral education of the deaf, and to which the writer bears the most unequivocal testimony. Ponce de Leon's most distinguished pupils were Francisco and Pedro de Velasco, brothers of the Constable of Castile, and the former himself heir to a marquisate. They were both born deaf. It is of the second that we have an interesting account in another contemporary record by Ambrosio de Morales, historiographer to Philip II., who describes, from a piece of writing he had from Pedro himself, the method by which he had learned to speak.

Ponce de Leon's method of instruction consisted in first teaching to write the names of objects, then articulation, followed by the association of the written words with their spoken forms. Writing thus had a prominent place as an instrument of education, the more so that lip-reading does not appear to have had any attention, its place being taken by writing and signs, and the pupils replying by speech. There is no evidence of the use of a manual alphabet. In another contemporary account by Francesco Valles, physician to Philip II., the writer refers to Ponce de Leon's method as proving that, although we learn to speak first and write afterwards, such an order has no natural necessity, seeing that the reverse order answers the same purpose equally well with those whose ears are closed.

Ponce de Leon, there is good reason to believe, left a written account of his method, but this was lost, probably in a fire which consumed the archives of his monastery.

Juan Pablo Bonet (d. 1629?) As to Ponce de Leon belongs the distinction of being the first instructor of the deaf, so to Bonet belongs that of having produced the first extant work on their education, the *Reduccion de las Letras, y arte para Enseñar a ablar los Mudos (Simplification of the letters of the Alphabet and Method of teaching deaf-mutes to speak)*, published at Madrid in 1620. Of its author little is known, except that he was born at Jaca in Aragon, in the latter part of the previous century, and filled various important positions in the service of the King and great officers of State, including that of secretary to the Constable of Castile. He was a man of the world rather than a cloistered teacher like Ponce de Leon, and, as a matter of fact, there is scarcely any evidence that teaching the deaf was at any time his vocation. Bonet, in the preface to his work, states that he was moved to write it from gratitude to the family of his master the Constable of Castile, who had a brother, Luis de Velasco, who lost his hearing at the age of two, and was made Marquis of Fresno by Philip IV in 1628. But he nowhere says anything of having educated this nobleman; on the contrary, we learn from other sources that this was done by Manuel

Ramirez de Carrion, who was also tutor and secretary to another deaf-mute, the Marquis of Priego. Ramirez de Carrion, in a work published in 1629 on another subject, himself states that he "was occupied with the education of Luis de Velasco for four years, and though broken by such long intervals, that it hardly left three full years, I taught him to read, write, speak, and converse with such success, that he felt no other deficiency than that of hearing." From his position in the Constable's household, Bonet must have been acquainted with Ramirez de Carrion; it is therefore the more remarkable that neither refers to the other in any way. All that can certainly be said on the point is that, whether or not Bonet had any share in Luis de Velasco's education, he has in his book described the method pursued.

It is of Luis de Velasco, who was indirectly descended from Ponce de Leon's pupils of the same name, that Sir Kenelm Digby gives an interesting, if somewhat hyperbolical, account in the course of a chapter on the sense of hearing in his *Treatise on the Nature of Bodies* (1644), taking occasion thence to illustrate how one sense may supply the want of another. Digby was at Madrid in 1623, when Charles I. of England, then Prince of Wales, arrived to seek the hand of the Infanta in marriage, and joined his suite. They had frequent opportunities of meeting Luis de Velasco and his tutor, the Prince being greatly interested in the matter, and what seemed to have astonished him and Digby most was Luis' facility in lip-reading. Digby mentions Bonet's book in his account, but does not give the name either of the author, or of Luis' teacher, indeed, it is apparent that on these points he is in some confusion.

Bonet's work is of sufficient importance in our history to justify a detailed analysis, which will also explain his method.

Analysis of the 'Reduccion de las Letras.' This work consists of two books. Book I., containing 38 chapters, is a treatise on the simplification of the letters of the alphabet, *i.e.*, the reduction of their names to their simple phonetic elements, just as, for instance, we may reduce 'zed' the name of the letter *z* to the simple sound represented by this letter. The articulation of each letter is described, and an attempt made at a fanciful analogy between their forms as printed and those which they are supposed to have when articulated. Bonet conceived that by directly associating the letters with their phonetic forms rather than with their names the task of learning to read would be facilitated. The connection of this book with the next is explained by the necessity he perceived of reducing letters to their phonetic values, as a preliminary to any method by which the deaf could be taught to speak.

Book II. is on the method of teaching the deaf to speak, and properly consists of two divisions, the first seven chapters being devoted to that subject, and the remaining sixteen to a grammar of the Spanish language adapted to the use of the deaf, with its practical application.

CHAP. 1. The causes of dumbness are explained, the true and commonest one being deafness, the organs of speech not being necessarily injured, consequently the deaf can be taught to speak. The best time to do this is from the sixth to the eighth year of their age.

CHAPS. 2 and 3. The method of teaching the deaf speech is only possible through the medium of an artificial language formed of visible manual signs. "The deaf are both most quick to comprehend the gestures made to them, because they attempt thus to supply the loss of hearing, and very clever at making use of them themselves . . . to take the place of speech. And so the instrument to be chosen should be one to which they are habituated, and the sounds of the letters must be made known to them by signs." Such signs are provided in the one handed manual alphabet, illustrated by plates showing the position of the hand for each letter with the symbol, both the capital and ordinary form, written above it. "It is necessary that in a house where there is a deaf-mute, all who can read should know this alphabet, in order to converse with him by its means, and not by other signs, which will be less beneficial to him, whether it be writing or manual gestures; nor should they permit him to make use of them, but he should reply by word of mouth to the questions put to him."

CHAP. 4. The pupil must first learn the use of this manual alphabet in association with the printed one.

CHAP. 5. Then we may proceed to teach him the pronunciation of the letters, beginning with the five vowels, as being the easiest, each letter being first spelt on the fingers, and associated with the printed letter, so that he may comprehend what he is uttering.

CHAP. 6. This describes the organic positions necessary for the pupil to pronounce each letter, with special directions for meeting difficulties. The pronunciation of syllables is next proceeded with according to certain rules.

CHAP. 7. The pupil is next to learn the pronunciation of words, beginning with the easiest, consisting of syllables of two letters each, such words to be also the names of objects at hand with which they can be associated as their names.

CHAP. 8. After having learned to read, the pupil must learn language according to rules, specially adapted to his case, seeing he does not acquire it as the hearing do. The most important is the reduction of the parts of speech to three—the noun, including all words which admit of gender and number; the verb, including all implying variation of person, tense and number; and the conjunction, including all words which are always used in the same unaltered form.

CHAP. 9. Common nouns may be learned by direct association with the objects with the assistance of the manual alphabet. Abstract nouns cannot be so taught, but may be gradually learned by being associated precisely with the states or qualities of mind signified, as occasion may supply, or as may be artificially produced with discretion.

CHAP. 10. The verb being complex, the conjunctions, including adverbs and prepositions, should be learned first, by being committed to memory, so that they may be ready for the learner to use in their proper connections. "For this reason those who converse with him must always be careful that in asking him anything, or replying to him, the sentence shall be as complete as if they were speaking to a hearing person and never answer him by signs, or say things that are inaccurate and must be afterwards corrected, which will give rise to difficulty; but everything that is said to him should be accurate and true."

CHAPS. 11 to 13. These deal with the genders and plurals of nouns in Spanish. They are to be learned mainly by a well directed and repeated use.

CHAP. 13 (bis). "Since verbs signify not things actually having existence, but only actions, they must be taught by imitating these actions as closely as possible: as, running, walking. In the case of those verbs expressing states of mind, we must pursue the same method as with abstract nouns." The conjugations are to be learned by degrees.

CHAP. 14. The tenses may practically be reduced to three, past, present and future, the meaning of which can be illustrated by the days of the week, aided by significant signs. The "persons" are to be taught next by associating one or more actors in some common action with the person or persons specified. The use of the intermediate tenses should be gradually taught by their relation to the three chief ones, aided by practice.

CHAPS. 15 to 19. Various classes of verbs and their conjugations, &c., are explained; the verb 'to be' requiring a special demonstration by means of the three tenses as in Chap. 14.

CHAP. 20. Counting is to be learnt by first learning the names of the numbers, and next their use explained by counters, such as peas. Arithmetic can then be taught in the usual way.

CHAP. 21. This is one of the best in the work. It is shown how the pupil should be exercised by a set of methodical comparisons to remark the differences and analogies of objects, in respect of size, colour, weight, qualities, &c., in such a manner as to make them stand out by contrast, and to classify them. "In this lesson he ought to be well versed; and this can be easily accomplished, for it is the very threshold of reasoning; and he must learn that words are concepts by which he is to express what he thinks."

CHAP. 22. "In order that the deaf-mute may become intelligent and capable, it will be an important part of his education that he be asked every evening what he has done in the daytime." And generally his progress in language will be promoted by a constant resort to question and answer, as occasion may suggest. Particular attention is to be given to synonyms.

CHAP. 23. The pupil should be set to read easy books, and give an account of what he reads. At this stage also he should reply to written questions by writing.

"For the deaf-mute to understand what is said to him by the motions of the lips and tongue there is no teaching necessary . . . some of these he knows already from learning to speak . . . It would be an unwarrantable thing to expect all who speak to the deaf to do so with the mouth widely opened. . . . The reduction of the motions to a system to enable the deaf-mute to understand by the lips alone, as it is well known many of them have done, cannot be performed by teaching, but only by great attention on their part; and it is to this that their success is to be attributed, and not to the skill of the master." Lip-reading is also greatly aided by ability to catch the meaning from the context.

Writing may be taught after learning to read. The work concludes with "Suggestions for rendering this method useful to foreigners."

A few remarks may be made on the merits and faults of the method as unfolded in the above analysis. Amongst the former may be instanced making speech the basis of education; the reduction of the elements of language to three essentials; the use of an objective form of instruction in the association of names with the things and verbs with the actions signified; practical comparison as a mode of learning language ; the exclusion of signs other than the manual alphabet, and the use of this by others only ; the training of the reason by a free resort to question and answer in all the circumstances of life. The chief fault is the necessity of committing to memory the various classes of words before learning their use in language—thus unduly taxing the scholar's memory—together with too great a deference to grammatical rules in acquiring the latter. Bonet in fact had no conception of the intuitive or logical method of learning language.

It is quite certain that Bonet was well acquainted with Ponce de Leon's achievements, but to what extent he was, if at all, indebted to his predecessor it is now impossible to say.

Ramirez de Carrion afterwards, about 1638, carried on with much success the education of the Prince of Carignan, a son of Prince Thomas of Savoy, who was general of the troops in Spain for some years, and whose mother was the Infanta of Spain—a fact that would explain Ramirez's connection with Italy. There is evidence that his method was substantially that described by Bonet.

John Bulwer (fl. 1654). Bulwer was a physician who devoted great attention to questions relating to the deaf, and wrote the first English work on them. In 1644 he published *Chirologia : or, The Natural Language of the Hand*, and *Chironomia : or, The Art of Manual Rhetoric.* In these works he analysed the language of manual expression in its application as an aid to speech, acting and oratory. The study of this subject probably led Bulwer to that of the education of the deaf, for in 1648 he published *Philocophus : or, The Deaf and Dumb Man's Friend. Exhibiting the philosophical verity of that subtile art, which may enable one [born deaf and dumb] with an observant eye, to hear what any man speaks by the moving of his lips . . . and thence learn to speak with his tongue.* The title of this work sufficiently explains its object. The occasion of it, as the author states in his dedication to Sir Edward

Gostwicke, was the dumbness of this gentleman and his brother, who, although proficient in the use of signs and the manual alphabet, desired to acquire speech. Bulwer, rejecting the old idea of a natural connection between the ear and tongue, based the possibility of teaching the deaf to speak on "a community among the senses and their mutual exchanging of objects," which opened up "other avenues unto the brain, as oral and dental audition, of which we have discovered sufficient ground to raise a new art upon, directing how to convey intelligible and articulate sounds another way to the brain than by the ear or eye, showing that a man may hear as well as speak with his mouth. Upon which and other unlooked for discoveries, I began in idea, to conceive the model of a *new Academy*, which might be erected in favour of those who are in your condition, to wit, originally deaf and dumb." Bulwer commends his work to Gostwicke, "that learning first to write the *images* of *words*, and to understand the conveyances of a *visible* and *permanent* speech; from that *hand A B C* you may proceed unto a Lip-Grammar, which may enable you to *hear with your eye*, *and thence learn to speak with your tongue.*"

In pursuance of this design, *Philocophus* consists first of a table of "hints and notions," stated aphoristically, by way of introduction to the main part, which is devoted to an examination of the nature of voice and speech, the keynote of which is that the latter is nothing but a form of voluntary physical motion. Then to confirm the reasons which he advances for the possibility of instructing the deaf to speak, Bulwer quotes in full Sir Kenelm Digby's account of Don Luis de Velasco, with a running commentary, that takes up more than half of the book. He records many remarkable cases, some within his own experience, of what the deaf could do in the way of expressing themselves or understanding others, particularly by means of lip-reading.

Bulwer evidently apprehended the place of touch in the perception of sounds by the deaf, and the relation of speech and lip-reading as that of motion and form. He was, however, apparently not a teacher, and does not describe any method, as he deals neither with the phonetic elements nor with teaching language, but he may have done so in another work which he announced for publication. It never saw the light.

"George Sibscota." Under the reputed authorship of this name, there appeared in 1670 a little work called *The Deaf and Dumb Man's Discourse.* In reality it is a translation of an essay written some fifteen years previously by Anthony Deusing, Professor of Medicine at Groningen, who died in 1666.

Deusing, while adhering to the old view as to congenital deafness and dumbness having a common pathogenetic origin, says the vocal organs are not necessarily injured thereby, as the latter condition may arise only from the inability to acquire speech due to the former, speech being artificial, not natural. He rather doubts the practicability of deaf-mutes as a class learning to speak, and recommends writing, signs, and, on occasion, lip-reading, as the most useful instruments of education and intercourse. This essay is obviously an attempt at reconciling new facts with old views, and is of no importance.

William Holder, D.D, F.R.S. (1616—1698). Holder was a clergyman who held several important livings, and was a brother-in-law of Sir Christopher Wren. He gave great attention to studies connected with music, and published one or two works on it. While Rector of Bletchington, in Oxfordshire, he in 1659 undertook to teach speech to Alexander Popham, the congenitally deaf son of Admiral Popham and Lady Wharton. The method he employed Holder afterwards explained at length in his *Elements of Speech, &c., with an Appendix concerning persons Deaf and Dumb*, published in 1669.

The main part of this work is an analysis of the sounds of speech based on the modes of their organic production, with the object of "directing to a steady and effectual way of instructing Deaf and Dumb persons to obtain a reasonable perfection of utterance of speech, and to discern, in some measure, with their eyes, by observing the motions of their mouths, what others speak."

Holder arranges the speech-sounds according to what he calls the "appulse" of one organ to another, as follows:—

I. Appulse of one organ to another, consonants by degree.

1. Plenary Close. Labial *b, p, m.*
Gingival *d, t, n.*
Palatic *g, k, ng.*

2. Partial Pervious. Labio-dental *v, f.*
Lingua-dental *dh, th.*
Gingival { sibilant *z, s*
jarring *r*
lateral *l.*
Palatic *zh* or *j, sh.*

II. Inclination of an organ to another without appulse.

Vowels. Guttural *oo, o, a* [fall].
Palatic *a* [fate], *æ, e, i* [eel].
Labio-guttural *w.*
Labio-palatic *u.*

All the above sounds are further classed as *commodious* and *uneasy*, and also as *ore-spirital*, *ore-vocal*, and *naso-vocal*. *i* in *stile* is a diphthong.

The *Appendix* is devoted to the practical application of the above analysis in giving the deaf speech. "They are dumb by consequence from their deafness, only because they are not taught to speak." Holder first considers some of the objections and difficulties of the task "which seem to discourage, and portend such a design unfeasible." The first is the indisposition on the part of the pupil to exercise his voice Therefore, he "must be gently and discreetly treated, and by all kind of pleasant usage wrought upon, to take some pains at it; watching your seasons, and taking great care, that he may not hate his task, but do it cheerfully . . . . .

and must exercise often, and a little at a time." Another difficulty, that of distinguishing apparently equivocal sounds or words, may be surmounted by the pupil sagaciously inferring them from their relations with the context.

Holder's analysis of the speech-sounds leads him to propose the following as the order of facility, determined by their degree of appulse, in which they should be taught:—*p*, *b*, *t*, *d*, *k*, *g*, *m*, *n*, *ng*, *f*, *v*, *th*, *dh*, *s*, *z*, *sh*, *zh*, *j*, *ch*, *l*, *r*, *h*, *a*, *e*, *i*, *u*, *o*, *oo*, *w*, *y*.

The scholar should have previously learnt to write, so as to be able to associate these sounds with their written forms, so that "whatsoever you gain upon him this way, will be retained, and made use of in the other." He should next learn the manual alphabet, and use it as a means in acquiring the pronunciation of words. After the sounds have been learnt apart, they should be joined and uttered as syllables, and so on to words, which are to be associated with what they signify, with the aid of suitable signs as circumstances may require.

John Wallis, D.D., F.R.S. (1616—1703). Alike from his eminent position, and the fame of his method of instructing the deaf, Wallis is one of the most interesting names in our history. By profession a clergyman—he was secretary to the Westminster Assembly of Divines—he was by avocation a man of science, and one of the foremost of his time. His special study was mathematics, and in the history of this science Wallis is regarded as the greatest of Newton's English precursors. In 1649 he was appointed Savilian Professor of Geometry at Oxford. Zealous for the new or experimental philosophy, he associated with Robert Boyle, the celebrated physicist and chemist, and other reformers of scientific method, whose weekly meetings led to the incorporation, in 1663, of the Royal Society. He long helped to sustain its reputation by imparting his own inventions and expounding those of others.

Wallis has himself explained his connection with the education of the deaf in an autobiographical letter addressed to Dr. Thomas Smith, dated January, 1696–7, and published in Hearne's *Peter Langtoft's Chronicle*, Vol. I., 1725. He says, "In the year 1653, I was persuaded to publish *Grammatica Linguae Anglicanæ* [*A Grammar of the English Language*]; chiefly to gratify strangers, who were willing to learn it (because of many desirable things published in our language), but complained of its difficulty for want of a grammar, suited to the propriety and true genius of the language. To this I prefixed a Treatise of Speech (*De Loquela*), wherein I have philosophically considered the formation of all sounds used in articulate speech (as well of our own, as of any other language that I know;) by what organs and in what position each sound was formed; with the nice distinctions of each, (which in some letters of the same organ, is very subtile:) so that, by such organs, in such position, the breath issuing from the lungs, will form such sounds, whether the person do or do not hear himself speak." He claims to have been the first to attempt anything like a complete scientific analysis of the phonetic elements of speech as based on the mode of their organic production. However that may be, Wallis continues, "In pursuance of this, I thought it very possible to teach a deaf person to speak, by directing him, so to apply the organs of speech, as the sound of each letter required, (which children learn by imitation and manifold attempts rather than by art:) And in 1660 being importuned by some friends of his, I undertook so to teach Mr. Daniel Whaley of Northampton, who had been deaf and dumb from a child. [Elsewhere Wallis states that Whaley's uncle had seen his *De Loquela*, and prevailed on him to undertake his nephew's case. Whaley was about 25 when he came to Wallis.] I began the work in 1661, and in little more than a year's time, I had taught him to pronounce distinctly any words, so as I directed him, (even the most difficult of the Polish language, which a Polish lord then in Oxford could propose to him, by way of trial:) and in good measure to understand a language and express his own mind in writing; and he had in that time read over to me distinctly the whole or greatest part of the English Bible; and did pretty well understand, at least, the historical part of it. In 1662, I did the like for Mr. Alexander Popham with like success. On whom Dr. Holder had before attempted it, but gave it over. . . . I have since that time, upon the same account, taught divers persons, and some of them very considerable, to speak plain and distinctly, who did before hesitate and stutter very much; and others, to pronounce such words or letters, as before they thought impossible for them to do: by teaching them how to rectify such mistakes in the formation, as by some natural impediment, or acquired custom, they had been subject to."

Fuller details are given in a letter of Wallis' to Robert Boyle dated December, 1661, and published in Vol. 6 of the latter's works, 1772, in the course of which he says, "I am now upon another work; as hard almost as to make Mr. Hobbes understand a demonstration. It is to teach a person dumb and deaf [Whaley] to speak, and to understand a language: of which if he could do either, the other would be more easy; but knowing neither, makes both the harder." Whaley, it appears from the same letter, had lost his speech in consequence of deafness when five years old, and before he came to Wallis had learned to write "as an English scrivener writes Greek, of which he knows neither the sound nor sense." These details are further amplified in another letter to Boyle, dated March, 1662, and published in the *Philosophical Transactions* of July, 1670, to which is appended a note informing us that Wallis brought Whaley before the Royal Society in May, 1662, and also before the King and Court at Whitehall, to demonstrate his method.

In another letter, addressed to Thomas Beverly, dated September, 1698, and published in the *Philosophical Transactions* of October, 1698, Wallis further informs us that "some other deaf persons, I have not attempted teaching them to speak; but only so as, in good measure, to understand a language, and to express their mind tolerably well in writing . . .

and become capable of such further knowledge as is attainable by reading."

Wallis' undertaking the instruction of Popham led to an unhappy dispute with the latter's former teacher, Holder, who had accused him of being an impostor. Wallis warmly repelled this in a pamphlet—*A Defence of the Royal Society, &c., in answer to the cavils of Dr. W. Holder.* 1678. On the one hand, Wallis had published his *Grammar* with the tractate on speech in 1653, while Holder did not publish his *Elements* until 1669, but, on the other hand, Holder had taught Popham in 1659, while Wallis did not teach Whaley until 1661. It appears that the two divines were acquainted with each other. The facts are insufficient to enable us to decide the question of priority, but as the matter is not now of any importance, we need not go further into it.

In briefly analysing Wallis' method we will first take his *De Loquela*, which he afterwards used in imparting speech to the deaf. Wallis there arranges the simple sounds as follows:—

I. Vowels. (a) greatest opening (b) medium opening (c) least opening.	1. Gutturals. (a) *a* [fall] *o* [odd]: (b) *e* [liberty]: (c) *u* [cut] *o* [come]. 2. Palatals. (a) *a* [băt, pāle]: (b) *e* [thēse, tĕll]: (c) *ee* [feet] *i* [inn]. 3. Labials. (a) *o* [nŏt, hōle]: (b) *oo* [foot] *u* [full]: (c) *u* [muse].
II. Consonants. (a) mute (b) semi-mute (c) semi-vocal.	1. Labials. (a) *p*, *f*, *ph*: (b) *b*, *v*, *w*: (c) *m*. 2. Palatals. (a) *t*, *s*, *th*: (b) *d*, *z*, *dh*: (c) *n*. Unclassified, *l*, *r*. 3. Gutturals. (a) *c* [k] *ch*, *h*: (b) *g*, *gh*, *y*: (c) *n* [ng].

The sounds *f*, *ph*: *v*, *w*: *s*, *th*: *z*, *dh*: *ch*, *h*: *gh*, *y* are further classed as being aspirated *subtiliores* and *pinguiores* respectively.

The composite sounds, including *i* in *pine*, are treated of separately.

Wallis explains the theoretical principles on which the possibility of educating the deaf is founded in the second of the letters to Boyle, and their practical application in that to Beverly. He states that the task consists of two different parts, viz., to teach articulation, and to understand a language, each of which renders the other more difficult; because, on the one hand, the deaf cannot learn language, as the hearing do, "by the benefit of perpetual discourse"; and on the other, this want of language makes it necessary that "they should pronounce those sounds by art, which others do by custom they know not how."

This last, which is the first part of the task, he considers quite feasible, and in regard to the other, "why," he says, "should it be thought impossible, that the eye, though with some disadvantage, might as well apply such complication of letters or other characters, to represent the various conceptions of the mind; as the ear, a like complication of sounds?" The task is rendered easier, especially in learning language, by availing oneself of the "little actions and gestures [of the deaf], which have a kind of natural significance."

The same accuracy of speech is not to be looked for as in those who hear. Lip-reading is possible, when the pupil has a sufficient command of language to infer much from the context, since the eye cannot discern all the varieties of motion in the organs of speech.

Speech-sounds are to be taught by the pupil imitating the teacher in the necessary positions of the tongue, lips, &c., according to the mode of organic formation explained in *De Loquela*, but, unlike Holder, Wallis does not propose any order in which they are to be given.

To learn language, the first thing is that the pupil be taught to write, and next to use a manual alphabet. Language is to be taught by the same method as other children are at first taught, "only with this difference, the latter learn *sounds* by the ear, but the deaf person is to learn *marks* of those sounds by the eye. But both the one and the other do equally signify the same notions, and are equally of mere arbitrary signification."

The most natural way, then, to proceed is to furnish him with a *nomenclator*, or vocabulary, containing under their proper classes names of familiar things, with which they can be associated, and arranged so as to aid the memory and eye by contraries and correlatives, while general terms should be illustrated by particular instances, *e.g.*, *mankind* by *man*, and this in turn by the name of some known person. Similar lists are next to be made of all the classes of words usually ranged under the parts of grammar and their meaning explained. Then couple appropriate parts, as *my hand*, *white bread*, &c., and next begin syntax by inverting this order and using the copulative verb, *bread is white*, and similarly with other parts, such as noun and noun, &c.

Verbs should be learnt next and their use in the simple sentence explained. Prepositions and conjunctions are then to be taken, and their proper use illustrated by examples.

In time a complete book, with its tables, will thus be made up, which will serve the pupil for dictionary and grammar, and at all times he should be directed to write down what he or others may signify by signs, which language we must learn in order to teach him ours.

Wallis, as he himself states, had never seen Bonet's work, and it will easily be seen how crude his method is; it has few of the merits and most of the faults of that of the other. His letter to Beverly was translated into Latin, and appended to a late edition of his *Grammar.*

George Dalgarno (1626?–1687). If Wallis' illustrious position gives his work for the deaf a degree of interest it would not otherwise possess, that of Dalgarno, on the other hand, has a singular merit which is in striking contrast with his comparative obscurity. Nothing is known of him beyond the facts that he was a native of Aberdeen, was master of a private grammar school at Oxford for thirty years together, and at one time was also master of Elizabeth School in Guernsey.

In 1661, Dalgarno published *Ars Signorum, vulgo character universalis et lingua philosophica.* It exhibits a methodical classification of all possible ideas, and a selection of characters adapted to this arrangement so as to represent each idea by a specific character, without reference to the words of any particular language. This work, as the author states, led to the publication in 1680 of *Didascalocophus, or the Deaf and Dumb Man's Tutor*, of which we will now give an analysis.

CHAP. 1. *A deaf man as capable of understanding and expressing a language, as a blind.* This is so since "an equal degree of knowledge is attainable by the eye, and expressible by the hand in characters, or a language written," as by the ear, since "all signs, both vocal and written, are equally arbitrary and *ex instituto.* Neither is there any reason in Nature, why the mind should more easily apprehend the images of things impressed upon sounds, than upon characters; when there is nothing either natural or symbolical in the one or the other." The deaf have the advantage of the blind in the greater certainty and exactness of ocular knowledge.

CHAP. 2. *A deaf man capable of as early instruction in a language as a blind.* The author incidentally discusses the question whether writing or dactylology is the most suitable medium for learning the mother-language, and decides in favour of the latter as being easier, and coming nearer the circumstances and manner in which the hearing learn it *viva voce.* The mother should spell the words on her hand to her deaf child as she would speak to a hearing one, the objects, &c., signified being pointed out, and *vice versa.* In acquiring language the deaf boy undoubtedly is in a better position than the blind boy.

CHAP. 3. *Of a Deaf man's capacity to speak.* "That a deaf man may be taught to speak is no more a doubt to me, than that a blind man may be taught to write." The author gives several reasons. One is that "both must be equally obliged to the sense of feeling for direction," thus foreshadowing the now recognised place of touch in the oral education of the deaf. He remarks that it "will be hard to teach the deaf man to observe tone, accent and emphasis in speaking; so will it be as hard to bring the blind man to write a fair hand, or diverse hands, yet the one may speak so as to be understood, and the other write so as what he writes may be read." There are two things we may learn; 1. "that though hearing and seeing be the principal, yet are they not the only senses of knowledge," 2. "that the hand is, or at least is capable of being made, a more serviceable organ of interpretation to the soul than the tongue. For it has access to its mistress's presence by the door of three senses hearing, seeing and feeling; whereas the tongue can only enter by the door of one sense, and do its message only by one kind of interpretation—glossology," *i.e.*, speech.

CHAP. 4. *Of a deaf man's capacity to understand the speech of others.* This is fully admitted, except that all the distinctions perceived by the ear in speaking cannot equally be perceived by the eye. The deaf man must to a great extent depend on his own ingenuity in lip-reading.

CHAP. 5. *Of the most effectual way to fill a deaf man's capacity.* This is neither more nor less than *diligence* in the teacher; "the hand of a *diligent* tutor will not fail to make a *rich* scholar." Premising that reading and writing are the most certain means of educating the deaf, the author states that *diligence* consists in the frequent use of the *pen* and *fingers*; of what we should now call slates and note-books, in which common expressions can be written; of the manual alphabet; and abstention from "any other way of signing than by letters"—a rule which is also to be observed by others.

CHAP. 6. *Of a deaf man's dictionary.* The deaf scholar should learn the vernacular of his own country. "The way of teaching here, must be something mixt, and as it were middle between the grammatical way of the school, and the more rude discipline of the nursery. The first initiation must be purely grammatical; but when your scholar is got over this difficulty of knowing and writing his letters readily, then imitate the way of the nursery. Let *utile* and *jucundum*, variety and necessity, invite and spur him on. You must not be too grammatical in teaching, till you find his capacity will bear it. . . . It is enough for him to understand the word, or sentence proposed, without parsing, for this is all the use of language that children and the illiterate have."

When the scholar knows his letters—written, printed, or on his fingers—let him learn and make a vocabulary first of common things, their qualities &c., using the principle of contrast to aid him; then of words of action, *i.e.*, verbs. Do not adhere too rigidly to grammatical rules, but let *occasion be the best mistress of method.*

CHAP. 7. *Of a Grammar for Deaf Persons.* This deals not so much with grammar as with the practical application of syntax, which the author regards as "consisting in the cement of auxiliary particles" and their use in forming words into sentences.

The scholar should be practised on verbs of bodily action, such actions to be performed in association with the appropriate pronouns and tenses, adding other circumstances of time, place, and manner. After the use of the cupola is understood, that of the different classes of "particles" may then be explained, and as many of them "signify circumstances perceivable by sense, they are as easily apprehended as words signifying bodily substance or sensible quality," but at the same time they are to be taught as they offer themselves occasionally in practice, so as not unduly to tax the scholar's capacity. An excellent remark is that "where the principal verb of a sentence is clearly apprehended, it brings great light to other circumstantiating words." When the scholar has made some progress in the use of language, he may study grammar proper.

CHAP. 8. *Of an alphabet upon the fingers.* This will be referred to under "The Manual Alphabet."

Dalgarno's chief design being to teach the deaf how to understand a language by *reading* and *writing*, he does not give any method of teaching speech, although, as we have seen, he admits its possibility. His great merit, and one which marks a great advance, was in breaking away from the conventional grammatical method of learning language, and relying more on the intuitive power of the direct association of words with things and sentences with actions to put the deaf in possession of language.

Wallis and Dalgarno were acquainted with each other, but, strange to say, with the exception of a casual allusion by the latter, ignore each other in their works. It is, however, impossible to suppose that each was not indebted to the other to some extent, though Wallis' indebtedness was probably the greater. In later times Dalgarno's works attracted the notice of the philosophers Dugald Stewart and Sir William Hamilton (*Edinburgh Review*, 1835); the former in his *Philosophy of the Human Mind*, indeed, goes so far as to speak of "this very original thinker who had anticipated some of the most refined experimental conclusions of a more enlightened age." The Maitland Club of Edinburgh thought so highly of Dalgarno that it reprinted his works in 1834.

P. Francesco Lana (1631—1687). Although Cardan was an Italian, his fame was more European than national, so that it will not be amiss to notice another more closely identified with his country. Lana, or Lana-Terzi, was a Jesuit naturalist and physician, who spent the latter part of his life in his native town Brescia, where he projected a great work comprising all his researches into Nature, but of which he never succeeded in publishing more than a resumé—*Prodromo, &c., premesso all' Arte Maestra*, 1670. In this work he was led to consider the education of the deaf, which, according to him, consists in their first learning to perceive the disposition of the organs of speech in the formation of sounds, and then imitating them ; and recognizing them in others by lip-reading. To that end, they should first utter each sound separately, read it on the lips of another, then join them in words ; next they should be taught the meaning of these words by being shown the objects signified ; and gradually be made acquainted with the meaning of those which relate to the functions of the senses, the arts, the understanding, and the will.

Great as the difficulties of the deaf are, Lana considered they were capable of surmounting them. His views were clear and simple, but we have no knowledge of their having been practically applied.

Francis Mercurius, Baron Van Helmont (1618—1699). This was a son of the celebrated Belgian chemist, Jean Baptiste van Helmont, in whose steps he followed in a lesser degree, but whom he surpassed in a slavish adherence to the occult sciences. He spent a great part of his life at Sulzbach in Germany, and there, in 1667, published *Alphabeti vere naturalis Hebraici brevissima delineatio* (*a brief description of the truly natural Hebrew Alphabet*). He held that there was a language natural to men, that this was no other than Hebrew, and that each character of its alphabet represents in some manner the sectional figure of the position of the vocal organs necessary to pronounce it. From a consideration of the motions and configurations of the mouth, Van Helmont was led to observe that one born deaf is not altogether destitute of all motion of his tongue, that he may be taught to understand others by the motions of their mouth and tongue, and that this is more practicable in the "wide-mouthed" than "narrow-mouthed" languages. He describes a method of teaching the deaf to speak, in accordance with his principles, and mentions by way of example, having taught one in three weeks. This, to say the least of it, is doubtful. Altogether Van Helmont's work is so pervaded with mysticism, that it is unnecessary to do more here than call attention to it.

John Conrad Amman, M D. (1669—1724). Amman was a native of Schaffhausen, in Switzerland, and was educated for the medical profession at Basle. Having had to leave his country on account of his religious views, he went to Holland and settled as a physician at Haarlem. There he commenced the oral education of his first deaf pupil, Esther Kolard. He had many more subsequently, and we have independent testimony to his success as a teacher.

Amman's views on the education of the deaf were first given in a work, *Surdus Loquens* (*The Speaking Deaf*), published at Amsterdam in 1692, and of which an English translation was published by Dr. Daniel Foot in 1694. This work Amman afterwards greatly extended and issued in 1700 under the title of *Dissertatio de Loquela* (*A Dissertation on Speech, in which . . . the means are also described by which those deaf and dumb from birth may acquire speech, &c.*) Successive editions of it appeared up to 1740, and Charles Baker, of Doncaster, published an English translation in 1873.

Analysis of the "Dissertatio." In his preface Amman states that when he began to teach the deaf, he was quite unacquainted with the work of others, but afterwards met Van Helmont, and had some correspondence with Dr. Wallis, which is given *in extenso*, in which he admits he was not the first nor only author on the subject.

CHAP. I. The author gives some curious and mystical opinions on the origin of speech and language; holding that man was put in possession of them at his creation, exercising speech from an innate knowledge of things; that this language was purely intellectual, by which man had the power of effecting whatever he wished through his intimate union with the Creator; that with man's fall this natural language was all but lost, the letters only remaining, with a few vestiges besides; and that all the varied languages of the nations were the shadow of this primitive gift, destitute of its original force—in fact, "a mere artifice without which we should be mute." He also held that, if language was not learned traditionally, men were endued with the power to utter the sounds which would form a new language and be understood by all. Hence he held that deaf-mutes could not invent a language among themselves. Under the influence of this idea he could not see how deaf-mutes could be educated. But, instead of searching for the means in the mechanical action of the voice, he entertained the theory of an artificial restoration of the use of the voice.

The larger part of this chapter is, however, devoted to the more practical consideration of the nature of breath and voice, how they are originated, and the causes of their variations in pitch and tone; and to a description of the organs of speech, which he divides into those employed in forming breath and voice and those employed in articulation and modifying them in various forms. There is, he says, a certain difference between voice and non-sounding air, which is of such importance that, if it be ignored, most of the deaf would never learn to speak with a clear voice; for they would not know what the various positions of the mouth meant unless the palpable vibration of the larynx were shown to them.

CHAP. 2. This is on the organic classification of sounds, their nature and the mode of forming them.

Amman classes all sounds as vowels, semi-vowels, and consonants, each of which is guttural or dental or labial, according to the region of the mouth in which it originates.

I. *Vowels*, which are pronounced with a clear voice and hardly any impediment, are—

1. Simple, as guttural *a*, *e* in French *entendre*; dentals *e*, *i*, *j*, *y*, English *ee* and *eo*; labials *o*, *u*, *w*.
2. Mixed, as guttural and dental, German *ä*, English *aa* (in aal), French *ai*; dental and labial, German *ö*, *ü*, French *eu*, *u*.

II. *Semi-vowels*, which are pronounced with a vowel sound but with some impediment, are—

1. Nasal, as labial *m*; dental *n*; guttural *n* (before *k* and *g*).
2. Oral, as *r*, *l*.

III. *Consonants*, whose force consists not so much in some kind of sound as in the varying modification of non-sonorous breath, are—

1. Simple, comprising
   (a.) Mute sibilants, as gutturals *h*, German *ch*, Spanish *g*; dentals *s*, German *sch*, French *ch*, *g* before *e* and *i*; labial-dentals *f*, *ph*.

Vocal sibilants, as guttural Belgian *g*; dentals, French *z* and *j*; labial-dental *v*.

(b.) Mute explosives, as gutturals *k*, *q* and *c* before *a*, *o*, *u*; dental *t*; labial *p*.

Vocal explosives, as guttural *g* before *a*, *o*, *u*; dentals, *d*, English *th*; labial *b*.

2. Double, comprising (1) mutes, as German *x*, *z*, and *c* before *e* and *i*, English *ch*, *c* before Italian *e* or *i*; and (2) vocals, as English and Italian *j* and *g* before *e* and *i*.

Amman then proceeds to describe all these sounds in detail. Of the guttural *a*, as he calls it, he says, "it is the simplest of all, the key of the alphabet, and hence the initial letter among all nations." The diphthongs he dismisses in a few words, remarking that "generally they are formed from the successive, but quicker pronunciation of two, rarely three, vowels."

CHAP. 3. Amman explains his method of teaching deaf-mutes speech, and of correcting defects. After satisfying himself that the scholar "was of a quick and docile disposition, neither too young nor too old, but verging on youth, between eight and fifteen years of age, and that his organs of speech were perfect," he would proceed:

1. To get him to produce a clear emission of the voice and have the power of controlling it. Amman at the outset lays great stress on the value of touch as enabling the deaf to have an intuitive perception of sounds. He calls it "the great mystery of the art, and is, if it is right so to speak, the hearing of the deaf, or at all events what is analogous to it."

2. To teach him to pronounce first the vowels, then the semivowels, and next the consonants, at the same time making him repeat and write them from dictation, or recite from the written forms, until, by constant repetition, the association between speech and writing was firmly established. To assist the scholar a mirror was used. The pronunciation of the vowels Amman regarded as a "critical exercise," owing to the tendency to produce a sound different from the one required. The deaf, he says, never make nasal sounds unless taught to do so, but of all sounds *r* is the most difficult. The consonants are comparatively easy.

3. Then, combining the sounds learned, he next proceeds in the same way with syllables and words, beginning with the easiest. Later, he made his pupils read in a book, which he closed at the end of each line; then, securing their attention, pronounced the words, which they repeated after him. Thus he closely associated reading with artificial articulation. In lip-reading he taught his scholars to read not only his own speech, but that of all about them.

Of his method of teaching language, if he ever had any, Amman tells us scarcely anything. Though, as we have seen, he gave great attention to teaching articulation and lip-reading, he does not seem to have attached that degree of importance to language which would have made the former of real use to his scholars. He did not search out a philosophic method of teaching language, but proceeded as if it were a very simple affair. "When my scholar, a born deaf-mute, can read and imitate me a little in speaking, I treat him as a sheet of white paper, or as a young child. First, I teach the names of the most striking objects, substantives as well as adjectives, as also the more necessary verbs and adverbs, with a few conjunctions ; then the declensions and conjugations ; and lastly the idioms of language, which I illustrate by the most amusing and useful examples, in which necessary wants, reverence to God and his parents, honesty, good manners, &c., are expressed."

In his work, Amman was strongly influenced by religious motives, and his belief in the Divine origin of speech led him to the exaggerated view that it is the only means of expression which could be regarded as language. Hence his method of teaching was wholly oral. His ideas had a very great influence in determining that subsequently followed in Germany.

Early German Teachers. Germany cannot, and does not, claim any originality in respect to the earliest attempts at the education of the deaf. The works on the subject published in other countries found their way there, and a few, such as Van Helmont, Holder, and Amman's, were translated into German and soon practically applied. The first distinct results were achieved by L. W. Kerger, in the early part of the eighteenth century, at Liegnitz, in Silesia, who described his method in a letter dated 1704. The means he employed were writing, reading, articulation and lip-reading, drawing and pantomime, but chiefly the first. He attached greater importance to the last than had hitherto been usual.

Georges Raphel (1673—1740), a countryman of Kerger's, was led by the fact of having, in a family of six, three daughters deaf, to attempt their instruction, and described his method in his *Kunst Taube und Stumme reden zu lehren,* 1718, in which, like Kerger, he took Amman as his guide, but with modifications, and based the teaching of language on that by which hearing children naturally acquire it.

Passing by O. B. Lasius, who merely contented himself with teaching his pupils to read, write, and understand words by the direct association of ideas with writing, as described in a work published in 1775, we come to J. L. F. Arnoldi, a pastor who educated the deaf son of a Hessian nobleman, and afterwards others, with great success. His method was described and published in *Praktische unterweissung taubstumme personnen reden und schreiben zu lehren,* 1777. Its most distinctive feature was the large use made of pictorial representations as a means of teaching language ; Arnoldi, however, recognized its limitations in this respect. To this he added mimic signs, reading and writing, and articulation. In his use of pantomime he limited himself strictly to the natural signs invented by his pupils, and supplied the deficiencies of pictures by mimic descriptions, while verbs were explained by actual actions. While articulation is to be taught as far as practicable, Arnoldi lays it down as a principle that the essential object to be aimed at is to place the deaf, as soon as possible, in a position to read books, so as to be able the more completely to instruct themselves. He prepared a grammar specially adapted to his method, in which, amongst other excellent points, he relies more on habit and constant use than memory to learn the proper use of words.

Jacob Rodrigues Pereire (1715—1780) With the exception of one or two of no special importance, Pereire may fairly claim to be the first teacher in France. Born at Berlanga in Spanish Estremadura, he belonged to a family of Spanish Jews employed in commerce. Persecution drove them to Portugal, and then to Bordeaux, where they settled in 1741. Pereire had a sister deaf and dumb, and this circumstance, no doubt, excited his interest; as, besides being her first teacher, it appears from a letter written by a friend as early as 1734, indicating, in answer to Pereire's request, what books there were on the subject, that he was already studying it; and he tells us himself that he spent several years of reflection on it. He had for his next pupil one of his own people in 1744, and his success with him led to his having, in 1746, the charge of another, born deaf, one d'Azy d'Etavigny, from La Rochelle, who was then sixteen years old, and had already had some education at Amiens. Under Periere's care, this young man made such good progress as to obtain the favourable notice of the Caen Academy, and later on, in 1749, Pereire brought him before the French Academy of Sciences at Paris. In a memoir presented on that occasion, it is stated that "the objects of Pereire in the education of the deaf included teaching them not only to pronounce all the words of the French or any other language, but also, what is essential, to understand their meaning, and to express, both verbally and by writing, their thoughts like other people; rendering them, therefore, capable of learning and practising any art or science, except those for which hearing is necessary."

The Academy appointed a commission, of which Buffon was a member, to report on the value and results of Pereire's method. Their report states that "this young deaf-mute reads and pronounces distinctly all sorts of phrases; gives very sensible replies, both verbally and by writing, to familiar questions made by writing or signs; understands and executes whatever he is required to do by writing or the manual alphabet; recites prayers by heart; . . . and in all respects shows a competent knowledge of grammar and syntax . . . and is fairly correct in his articulation. . . . We find that the progress made by d'Azy d'Etavigny justifies Pereire in hoping that, by his method, congenital deaf-mutes can not only learn to read, pronounce, and understand common words, but also acquire abstract notions, and become capable of reasoning and acting like others. . . . We have no difficulty in believing that the art of lip-reading, with its necessary limitations, will be useful to other deaf-mutes of the same class . . . as well as the manual alphabet which Pereire uses."

All this made Pereire famous and brought him to the notice of the Duc de Chaulnes, an officer of high rank at Court, by whom he and his pupil were introduced to the King. The duke was the god-father of the celebrated Saboureaux de Fontenay, a deaf-mute from birth, whom he placed under Pereire in 1750. M. de Fontenay, who was then thirteen years of age, and had previously received some education, remained with him five years, and was his most distinguished pupil. In 1751, Pereire again appeared with M. de Fontenay before the Academy, which recorded its favourable opinion of the excellence of his method—consisting, as in the former case, in the use of reading, writing, articulation, the manual alphabet, and lip-reading.

Saboureaux de Fontenay's name is of historical interest as one of the earliest instances on record of the successful education of a deaf-mute. From all accounts he was an intelligent and apt scholar who did Pereire credit; and long after he left him, his own love of knowledge induced him to continue its pursuit. De l'Epée bears testimony to his high attainments, and speaks of a work written by him against the use of methodical signs, which he intended to publish. He also says "M. de Fontenay was indebted to M. Pereire for his knowledge of the French language; another person was charged with teaching him religion; afterwards he acquired several languages by the use of his methods and of dictionaries." M. de Fontenay himself became a teacher and succeeded surprisingly.

Pereire seems to have been as successful as he could desire, his reputation was secure, and he had more pupils as time went on. He enjoyed high patronage, had a royal pension, and at various times was presented to several European monarchs. His work was noticed by Rousseau and Diderot, the latter in his *Lettre sur les sourds et muets à l'usage de ceux qui entendent et qui parlent.* Our own country honoured him by his election as a F.R.S., in 1760 His efforts and sympathies were, however, confined to a privileged few, and from this circumstance, as well as his keeping his methods a secret, his work, unlike de l'Epée's, had no lasting effect on the deaf as a class.

Pereire's method practically perished with him, as unlike most others, he kept it a secret and never published any detailed account of it. He himself in a letter tells us that he believed his method "to be a secret which ought to be perpetuated in my family only." However, we are able to form some idea of what it is from various sources, chiefly miscellaneous writings of Pereire's, the public records of the time, and the accounts of his pupils, of which that of Saboureaux de Fontenay, in a remarkable letter written in 1764, is the best.

(1.) The most distinctive feature of Pereire's method was his manual alphabet. He had adopted the Spanish manual alphabet, but considering it to be inadequate to his purpose, he greatly simplified and augmented it. It served both as a means of communication and of indicating the pronunciation. M. de Fontenay tells us that it "is contained in the fingers of one hand, and is composed of twenty-five signs of written letters and of the signs which M. Pereire invented for conforming this manual alphabet exactly to the laws of pronunciation and of French orthography. Thus there are as many sounds—33 or 34—and written combinations (*liaisons*) —over 32—each making one sound in pronunciation, as there are signs in the manual alphabet; which for this reason, I named *Dactylology*, a word Pereire adopted. Moreover, the different sounds which the same letters and combinations had in different words were distinguished, so that the dactylology comprised in all more than eighty signs;" and Pereire says, "each particular position of the fingers indicates not only the form of one or several characters, but the arrangement and action of the organs of speech necessary to produce the value of the vowel or consonant which these characters indicate. . . . . My dactylology is also expeditious in indicating at once several letters by one sign. . . . . By habit it becomes closely associated in the scholar's mind with the organic movements of speech. . . . . It prevents ambiguities in pronunciation and writing . . . in reading it saves my pupils the disheartening trouble of spelling."

(2.) This manual alphabet closely associated with speech formed the fundamental basis of Pereire's method of teaching. In addition he made use of signs, reading and writing. Of pantomimic gestures, however, he never seems to have had any great opinion, as one of his pupils, Mdlle. Marois, tells us that when his pupils had made some progress in speech, he interdicted their use, and only resorted to them as a means of explanation to be dispensed with whenever he could do without them.

(3.) Pereire does not appear to have given lip-reading so prominent a place in his method as Amman did.

(4.) He divided his course of instruction into two periods; the first, of twelve or fifteen months, devoted to mechanical exercises in pronunciation, and the second to intellectual exercises in language and its meaning, and to the acquisition of some elementary knowledge; this latter course necessarily taking a much longer time.

(5.) As to his method of teaching language, M. de Fontenay describes his primary lessons in language as founded on action. "In the same manner," says he, "in which an infant learns French, so Pereire applied himself at first to give me a knowledge of words in daily use and of the commonest phrases, such as *open the window, close the window, open the door, close the door.* Finding me sufficiently acquainted with the dialogues of everyday life, he abandoned the use of gestures in my presence, but at the same time he employed the Spanish manual alphabet which he had enlarged and perfected. . . . . And in order to exercise me still more in the meaning of familiar phrases, he made me take part in doing everything according to the import suggested to my mind by the language which anyone would employ who wished to command me ; reply to all questions, easy or difficult ; and reproduce my own thoughts. He also obliged me to give a daily report of everything that had occurred, to repeat whatever had been said, to converse, to dispute with himself or others about everything of ordinary interest which we might think of ; to write letters in my own way to my acquaintances, and to reply to their's."

Pereire followed the same course that Nature does with hearing children ; beginning by giving his pupils a practical knowledge of everyday language, constantly exercising them by question and answer, accustoming them to converse and express their own thoughts, and carefully impressing on their minds by usage and examples the meaning and value of the different classes of words. And not till he had trained them in the practice of common language did he begin its theoretical instruction according to grammatical rules. It is quite clear, from various indications, that actions and objects were also made use of to teach language. M. de Fontenay himself indicates the spirit of Pereire's method when he says "I can say, without much doubt, that it was by usage I learned French, and that my education was not mechanical. . . . . This usage was nothing else than a constant repetition of the same words, phrases, and modes of speech, applied in all sorts of ways and on all occasions."

(6.) Popular opinion at the time regarded deaf-mutes as quite incapable of abstract and general ideas. How Pereire succeeded in surmounting this difficulty let M. de Fontenay again explain : "The exact and clear explanation of intellectual terms, abstract and general, is one of the most difficult parts of the work of teaching, and trying to both master and scholar. The former is obliged to find in daily events the means of making his scholar attain to the knowledge of abstract ideas; by this you will understand that there are in visible objects and in history primary signs which serve in some way as a ladder by which to reach this class of ideas." As an example, the following may be instanced. One day it would be raining. Pereire would take the opportunity to explain that to-morrow it might be fine, that he *expected* and *hoped* it would be so, from which he would proceed to deduce the word *hope.*

Belonging to this period are two other teachers, Ernaud and the Abbé Deschamps. The former, like Pereire, presented a memoir to the Academy in 1761, but it need only be said that in his method he accorded to lip-reading the pre-eminence the other gave to dactylology. They had a dispute with each other, which recalls that between Holder and Wallis. Deschamps had a private school at Orleans, to which he devoted his life and fortune, in this respect resembling his great contemporary de l'Epée, but his method differed in refusing to use signs as the exclusive means of education, relying chiefly on reading and writing, together with speech and lip-reading.

Henry Baker, F.R.S. (1698—1774). Baker was a well-known naturalist and poet, and author of a popular work on the use of the microscope. He had originally been brought up to the bookselling trade, and it was at the close of his apprenticeship in 1720 that he went to Enfield on a visit to a relative, John Forster, an attorney, who had a daughter Jane, born deaf, and at this time about eight years old. In the only autobiographical fragment Baker has left, and to be found in Nichols' *Literary Anecdotes,* he says, "Heaven put into my thoughts a method of instructing her—Jane Forster—to read, write, understand and speak the English language; which communicating to her father, he entreated me to make a trial, and from that time would never part with me, till I had perfected her in the language, and taught her not only to read, write and speak it readily, but likewise to understand the speech of others by sight, and be able to hold a regular conversation with them upon most subjects." With Forster's family Baker remained until his marriage, in 1729, to the youngest daughter of Daniel Defoe, the author of *Robinson Crusoe.* He is stated to have taught a large number of the deaf, including members of the aristocracy. We have, however, no details of his method beyond what is to be gleaned from four MS. volumes of his school exercises, now in the Arnold Library. They are well designed for their purpose, viz., to place his deaf scholars in possession of language, by a free use of all its forms in close association with every circumstance of daily life in and out of doors. It appears, moreover, that Baker wished to keep his method a secret, although Dr. Johnson states that he "once flattered me with hopes of seeing his method published." Louis Dutens, a French Protestant of good family, who had himself made some attempts to teach a deaf young lady, Miss Wyche, in his *Memoirs of a Traveller* bears personal testimony to the reality of Baker's work. In this connection it is worth noting that in a work, *The Life and Adventures of Duncan Campbell,* published in 1720, Defoe has a chapter on the education of the deaf, in which he advocates the use of the two-hand manual alphabet, and recommends Wallis' method of teaching language, giving also a long extract from his letter to Beverly. Baker may, as he claims, have devised his own method, but obviously he could not have remained long ignorant of what others had done before him.

Lorenzo Hervas y Panduro (1735—1809). This celebrated Spanish philologist was at first Professor of Philosophy at Madrid, then a Jesuit missionary in America, whence being driven by the proscription against his Order, he came to Italy, and ultimately was appointed Prefect of the Quirinal Library at Rome in recognition of his important philological researches. During his residence in this city he took a practical interest in the education of the deaf. This led to the publication of one of the most voluminous, comprehensive, and learned works on the subject, *Escuela Española de Sordo-mudos, o Arte Para Enseñarles a Escribir y Hablar el Idioma Español* (2 vols., Madrid, 1795). It would be quite beyond our limits to give even the briefest analysis of it; and this is perhaps the less necessary as, despite its merits, it was comparatively unknown, and does not appear to have had any influence on the general course of deaf-mute education. Suffice it to state that it consists of five parts—the first dealing with the deaf in the political, physical, philosophical, and theological aspects of the subject, and the linguistic questions it gives rise to; the second is a history of their education up to that time, which is the first complete account written; the third explains the practical method of teaching idiomatic language by writing; the fourth that of teaching speech; and the fifth is on the instruction of the deaf in metaphysical ideas and in moral and religious knowledge.

The Manual Alphabet. As the use of this in the education of the deaf has been alluded to several times, we will add a few notes on it. The art of indicating, or to be exact, spelling on the fingers words as spoken or written, is certainly of great antiquity, but its history is obscure. The earliest finger alphabets extant appear to have been founded on manual signs for numbers, as may be seen in the first chapter of Bede's *De Temporum Ratione*, where a "manual speech" is described. There is evidence that these manual alphabets were in common use in the Middle Ages for purposes of secret or silent intercourse, and three such, each for use on one hand, are figured in Rossellius' *Thesaurus Artificiosae Memoriae*, 1579, which, with minor differences, are the same as that so well figured by Bonet on eight plates in his *Reduccion*—and by Hervas y Panduro in his work—and used by him, as also in all probability it was by his predecessor

Ponce de Leon. This was introduced by Pereire into France, whence it found its way into the United States, and is now in general use except in Great Britain.

Bulwer, in his *Chirologia* and *Chironomia*, figures five sets of manual gestures, chiefly for rhetorical purposes, but which could also be employed as alphabets for secret and general use. The two-hand manual alphabet, which has so long been in use in Great Britain, is to be first found in an extremely rare pamphlet, *Digiti-Lingua*, published in 1698, but without any intimation that it would be of use to the deaf. It is also figured in Defoe's *Life of Duncan Campbell,* and de l'Epée speaks of a two-hand alphabet as being well-known to French schoolboys in his time.

Dalgarno devotes a chapter in his *Didascalocophus* to explaining various modes of forming a manual alphabet, including a symbolic one not unlike the two-hand form now in use, but he gave the preference to a kind of two-hand alphabet, which consisted in simply touching with the finger or thumb of the right hand certain places on the joints and other parts of one side of the left, corresponding to the letters of the printed alphabet, with abbreviations to indicate certain double and triple consonants. This was probably the first specially devised for the use of the deaf, all previous ones having been originally invented for other purposes.

Many other finger alphabets, chiefly syllabic or phonetic—of the former, the French Recoing's in the early part of the last century, and of the latter, Grosselin's at a later time may be instanced—were formed for the deaf, but as none ever acquired any permanent vogue, it is unnecessary to pursue the subject further.

Summary. As we have now arrived at a point when our history enters on a new phase, it will be proper to briefly review what has been placed before the reader. The most important point to be remarked is the sporadic character of the work accomplished in solving the problem of how to educate the deaf. As there was at the same time a general similarity in the different attempts made, there was no great advance along the line, and they were, moreover, almost wholly empirical. When we should, on *a priori* grounds, expect that the natural signs, which were certainly used by the deaf in all ages, would, together with the manual alphabet, be made use of, even if only as a starting point, in any attempt to instruct them, we find that the contrary was the case, since it was implicitly believed that ideas could only be expressed and understood in spoken words that could also be *heard.* Even when it was discovered that hearing was not a necessary condition of the association of ideas and words, it was still generally supposed that speech was the only form in which they could be expressed. and hence the first attempts were directed to an artificial restoration of speech to the deaf, which was then associated with words as written or read. Writing was an important medium of instruction, but natural signs and the manual alphabet were also employed, although simply as useful auxiliaries. Only very rarely was writing used without speech, as in the case of Lasius. No attempt was made to facilitate the deaf scholar's progress in language by giving a logical form to the instruction in it. Words were usually committed to memory, and their use in sentences taught according to grammatical rules, illustrated by being directly associated with the acts and events of daily life, and fixed in memory by constant and repeated usage. Lip-reading was acquired, as the result of learning speech aided by the scholar's ingenuity, but was insufficiently cultivated.

Judged by modern standards, the results were confessedly meagre, for great allowance must be made for exaggeration in the early accounts, except, perhaps, in the case of Saboureaux de Fontenay. And, further, in examining those of such men as Sir Kenelm Digby and Dr. Johnson, we perceive that the prejudice against the possibility of instructing the deaf as a class, was so strong that those who had been successfully educated were regarded as *prodigies*, rather than as the legitimate results of an adaptation of ordinary educational processes to the special conditions created by deafness.

The methods used may, in general, be described as what would now be called "combined," except that verbal forms of language were more strictly adhered to, signs being discarded as far as possible, and never developed into a language, since they were looked upon as merely supplementary aids to speech.

In the next chapter we enter on the period, first, of organized effort in the foundation of schools for all the deaf, and not merely a favoured few; and, secondly, of the differentiation of methods of education into the manual or sign, the oral, and, much later, the combined systems with its attendant controversies.

CHAPTER III.—MODERN HISTORY.

SECTION I.—FRANCE.

Charles-Michel de l'Epée (1712—1789). In the threefold character of the founder of the first school for the deaf irrespective of social condition, their self-denying teacher and sympathetic friend, and the originator of an entirely new method of instructing them, the Abbé de l'Epée is by common consent regarded as the greatest and most interesting personality in our annals. He was in truth the Apostle of the class he loved so well. His method has all but passed into the limbo of the obsolete, but the lustre of a great and noble life still remains and ever will be undimmed. We can, however, only very briefly recount the leading facts of his life, before proceeding to describe his method.

De l'Epée was born at Versailles, where his father was an architect in the Royal service. Originally intended for secular pursuits, he showed a decided predilection for the Church, for which he studied and in due course applied for admission to the priesthood.

His refusal to sign certain doctrinal formulas, however, closed the door on him, and compelled him to turn to the law as a profession, and in 1733 he qualified as an advocate at Paris. His stay at the bar was not of long duration, as he could not forget his old aspirations; and ultimately, through the good offices of the Bishop of Troyes, he was admitted into the Church in 1736. On the death of his patron, de l'Epée returned to Paris, where he had fresh troubles with his ecclesiastical superiors. One day, some time in 1760, the Abbé unexpectedly came across two deaf-mute sisters who had been charitably instructed by a Father Vanin by means of pictures, but whom his premature death had left desolate. Becoming interested in them, he there and then decided to take the good Father's place. At last de l'Epée had found his true vocation, and henceforward, until his death, his life was consecrated to the work of educating the deaf. How disinterested it was, may be inferred from the fact that out of his by no means large private income he set apart a considerable portion for the expenses of his school, which was entirely for the poor. His work attracted the notice of the great, amongst whom was the Emperor Joseph II. of Austria, who as a result of a visit to the school, sent a young ecclesiastic, the Abbé Storck, to be trained by de l'Epée as a preliminary to establishing the first national school at Vienna in 1779. On de l'Epée's death, his school was continued by his pupil, the Abbé Sicard, and two years afterwards, in 1791, was taken over by the Government and became the National Institution at Paris.

The Abbé published anonymously in 1776 an account of his method of instructing the deaf, under the title of *Institution des Sourds et Muets par la voie des signes methodiques*, but this was afterwards altered, extended and republished in 1784, under the title of *La Veritable Maniere d'instruire les Sourds et Muets, confirmée par une longue experience*, in three parts. In giving an analysis of this we shall at the same time indicate its author's method.

Analysis of "La Veritable Maniere." In the preface the author says, "The course of my studies not having given occasion for me to become acquainted with the works of Wallis, Bonet and Amman, I had not the least idea that it was practicable to make my two pupils speak. The only object I had in view was, to teach them *to think with order* and *to combine their ideas.* This I thought I might succeed in doing by making use of representative signs reduced to a method of which I composed a kind of grammar. . . . Pereire looked upon this as impossible. . . I therefore took it upon me to show that the system employed by Pereire, and which he called dactylology, although it could by degrees enable the deaf to learn to speak, was absolutely incapable of teaching them to make *a legitimate use of their faculty of thinking.*" De l'Epée ignored the fact that dactytology was not the exclusive means used by Periere.

PART I. CHAPS. 1 TO 9. The method of teaching the parts of language is explained with particular reference to the use, in association with them, of suitable signs, *e.g.* in teaching gender, "put your hand to your hat, for the masculine, and to the ear—the part to which a female's head-dress extends—for the feminine." The right hand placed over the left indicates the adjective in general, but if a particular word such as *great* is to be signified, "carry your hand to a certain height and make the established sign for an adjective." If *greatly* is to be expressed, it is necessary, in addition, to transfer the hand to the side, because an adverb is placed *beside* a verb tn modify it. The course of instruction is commenced by teaching the manual alphabet, associated with writing and the objects signified. Then the teacher proceeds to explain simple verbs, illustrating them by action, but without entering into their grammatical relations, or "metaphysic," which will be dealt with later on.

CHAP. 10. It is explained here how a series of signs may be developed from the simple radical sign for the infinitive of a verb, to express other related or derived ideas, as in the case of *to love, love, friendship, lovely, friend.*

CHAP. 11. How the operations of the imagination, which are the object of logic, may be explained to the deaf. This can be done by recalling to their minds familiar facts of experience, and showing in a practical manner how we exercise our judgment and reason in regard to them.

CHAP. 12-13. How the mysteries of religion may be explained to the deaf by analogy.

CHAP. 14. It is shown here how metaphysical ideas may be explained by being first analysed into simpler notions and then explained by methodical signs. The follnwing in explanation of *I believe* is a good illustration :—"I first make the sign for the singular of the pronoun—as already shewn—I next point my right forefinger on my forehead, to indicate the faculty of thinking, and then make the sign for *yes* ; after that I make the same sign for *yes*, putting my finger on my heart to indicate the faculty of loving; I then proceed to make the same sign for *yes* on my mouth, at the same time moving my lips; lastly I put my hand on my eyes, and making the sign for *no*, show that I do not see. The sign for the present tense only remains to be made and *I believe* written down. All these signs, of course, are made in the twinkling of an eye." Similarly a word like *unintelligibility* may be analysed and expressed by five successive signs.

CHAP. 15. How the deaf and dumb may be brought to understand in some measure what hearing is.

CHAP. 16. The author proposes and describes a dictionary for the deaf, in which words would be explained by their corresponding signs; but no new ones are to be invented, whenever others already known could be so combined as to express compound or metaphysical words and ideas.

PART II. This part is devoted to explaining the method of teaching articulation on the lines of Bonet and Amman's, but with modifications which, in the author's opinion, rendered it easier. He did not employ speech as a medium of instruction, partly because it involved so much individual work, and partly because he held that a too exclusive attention to it interfered with the scholar's mental growth. Lip-reading may be taught, but it is likely to prove injurious if the scholar cannot already write and spell accurately.

PART III. This consists of the author's correspondence with Heinicke on the merits of the sign and oral methods, and the decision of the Zurich Academy thereon, which arose in consequence of Heinicke having written to the Abbé Storck to dissuade him from following de l'Epée's method. The controversy turned chiefly on the question whether speech or signs were necessary in order to relate the ideas of the deaf to written language, and the intellectual to the sensible—in other words, to be the language of thought. The following extract from the decision of the Zurich Academy, which was in favour of the Abbé, will serve to explain this and a few of his fundamental principles:—"The forms of written letters and words are no more symbols of things themselves to your scholars than to us; but as to us who hear writing is the interpreter of speech, and by that means, of ideas, so to deaf-mutes writing is only the reminiscence of methodical signs, which is *their* speech. But since none of us learned either to write or read in order that he might learn to think, we presume you do not propose writing as the instrument to elicit the power of thought and reason in the minds of your scholars. As speech was our conductor to thought and reason, so in a similar way does this admirable expedient of methodical signs lead your scholars thither. By this means alone you might no doubt educate your scholars, but you wisely add writing as an aid in the cultivation of their minds. . . . *They* translate written words into signs, as *we* do into sounds, and in this manner more easily grasp the sense of whatever is printed or written; and when they are thinking, they think not by letters, but by those signs which we have already observed to be their speech."

This discussion was the beginning of the long controversy in regard to the merits of the two methods, which has continued ever since.

It will now be seen that de l'Epée's method was based on the assumption that the natural or mimic language of signs of the deaf was the only one in which they could think and reason, and as all others, in his view, were necessarily inadequate to the needs of their intelligence, it was taken as a starting point and so developed as to be capable of expressing all their ideas. How this was done is lucidly described by de Gerando in his *De l'Education des Sourds-Muets de naissance.*

"The vocabulary of the mimic language of the deaf is poor, compared with that of our conventional languages, since it furnishes signs for the most familiar ideas only, and, moreover, has no syntax corresponding to that of our languages. In these circumstances, what was the Abbé to do? He was forced, by an unavoidable necessity, to form for the deaf, on the basis of their rudimentary mimic signs, a second but infinitely more extended mimic language; and to construct it on the model of our conventional languages in such a way as to correspond with them in vocabulary and syntax, so that after having made the deaf-mute a present of it, he obtained what was wanting in his translation. He could then, by a fresh process, translate this new language into any of our conventional languages which it might be necessary to teach the scholar. In attempting to construct this new mimic language on the basis of that formed by the deaf-mute himself, and to impart to it the same character, de l'Epée imagined that this new language, joined to the other, would constitute his mother-tongue, and that in this way, while faithful to his principle, he was really doing as those do who teach a foreign language to anyone who knew only his own vernacular. Such was the origin of *methodical signs.*" It should be added, however, that they were not exclusively mimic, but were largely arbitrary and conventional, and they became still more so when the Abbé reduced many of them to mere signs of indication (*signes raccourcis*). With these methodical signs writing was associated in the process of translation, the written word representing the mimic term, and the latter the idea it was desired to express to the scholar in the conventional language of the hearing.

It is not surprising that, dominated as he was by the idea of the language of signs being the vernacular of the deaf, by which alone could they translate written language into the ideas corresponding to it, the Abbé considered it hardly possible for them to express their ideas directly in writing. Speech for the deaf he regarded as a purely mechanical operation having no sort of relation to their intellectual activities, and lip-reading, as far as it went, as of precisely the same value as the manual alphabet.

Roch - Ambroise - Cucurron Sicard (1742–1822). The Abbé Sicard was at first head of the Institution at Bordeaux founded in 1782, for which post he had had some training under de l'Epée, but on the death of his master he succeeded him in the school at Paris. Sicard was perhaps the most eminent teacher of the first quarter of the last century, and to the pious zeal of his predecessor added a more philosophical method of work. He not only carried out and developed to their utmost the principles of de l'Epée, but endeavoured to perfect his method in those points in which it was defective. He thus amplified and improved the vocabulary of methodical signs; gave a more rational character to the teaching of grammatical forms, which de l'Epée had regarded as merely conventional, by explaining their logical relations; and recognized that the chief aim in educating the deaf was to enable them to express themselves in our vernacular as well as in their language of signs—an aim that, as we have seen, was practically neglected by de l'Epée.

Sicard's chief works were the *Theorie des Signes* (1818), and *Cours d'Instruction d'un Sourd-Muet,* the first dealing with the vocabulary, and the second the syntax of the language of signs. The former—a remarkable work apart from its special object—is really a dictionary of words together with the methodical signs necessary to their explication. Thus every word is explained by a pantomimic representation made up of a series of signs intended to correspond to the different elements of the idea expressed by the word. As a rule, one at least of these signs would, from its mimic character, have some analogy, however faint, to the leading element in the idea, while the others would be more or less arbitrary and conventional, and connect that element to others or express some grammatical relation. To facilitate the formation of these representative signs, the words are arranged, not alphabetically, but in so many classes of general ideas, in each of which the words are arranged in a natural relation to one another. Thus all the parts of a *town* are classified together with reference to *house,* the sign for which serves as the root sign for *church, palace*, &c. This ingenious and elaborate scheme was, however, doomed to failure at the moment of its birth, for the law by which all originally natural, symbolical, or intuitive forms of expression tend to degenerate into purely conventional forms, came into operation here; and the language of signs actually employed by Sicard and his pupils, was simply a stenographic reduction of that described in the *Theorie des Signes.* One or two examples will illustrate this.

"*A hunter or sportsman.* 1. Represent, by other signs, all kinds of game, such as deer, hares, birds, &c., running or flying, as the case may be. 2. Figure a man carrying a game bag, a gun on his shoulder, followed by several dogs. 3. Imitate the action of shooting and killing."

In practice this series of signs was reduced simply to the action of *shooting*, together with the sign for *man,* or his sex.

"*To urge.* 1. Figure two persons, one of whom has to do something. 2. Determine this by representing some definite action, such as writing a letter. 3. One of the two presses on the other the necessity of doing this by touching repeatedly his elbow with the right forefinger, accompanied by an appropriate facial expression. 4. The sign of the indefinite mood."

The reduced sign for this was striking the left elbow repeatedly with the right forefinger.

Sicard, of course, employed the manual alphabet and writing as means of instruction in addition to the language of signs, which was the chief. Two of his pupils, Jean Massieu and Laurent Clerc, acquired some celebrity; indeed, Sicard's *Cours d'Instruction* is the relation of the education of the former, but does not call for any special notice here.

We must now consider our subject from the general rather than the personal standpoint—a course necessitated by the great increase in the number of teachers, authors, and schools for the deaf. As methods of education became less original and tended to conform more and more to some accepted standard, their details have less importance and interest.

The method of the Abbé de l'Epée, in which signs, either natural or methodical, were the basis of all instruction, and speech only an auxiliary more or less useful when taught at all, was in principle the accepted standard in the great majority of French schools for the first three quarters of the last century. Known on that account as the "French system," it was, nevertheless, a great advance on the particular method followed by de l'Epée. There were, however, great variations in its practice; but, following J. J. Valade-Gabel, they may be classified as follows:—

1. The school of de l'Epée, which made methodical signs the pivot of instruction. Two of this school, the Abbé Jamet of Caen and the Abbé Laveau of Orleans, went even further and invested natural signs with grammatical inflections contrary to their nature, subordinated pantomimic construction to French construction, and made signs serve only as a mode of pronouncing written language.

2. The school of Sicard and Saint-Sernin insisted less on the necessity of methodical signs and relied more on grammar and the processes by which its practical application might be understood.

3. The school of Bebian and the Abbé Chazottes wholly discarded methodical signs, and taught the French language by direct translation, with the aid of natural signs and grammatical processes.

The French system was not, however, unreservedly accepted in its native country, and one of the earliest to attack it at its more vulnerable points was the Baron de Gerando (1772-1842), a well-known functionary of State and philanthropist, who, from his studies on the influence of signs in the formation of ideas, had been led to consider the question of the education of the deaf. The results of this study were published in his *De l'Education des Sourds-Muets de Naissance* (2 vols., 1827), in many respects a valuable work, distinguished chiefly by its clear exposition of the nature of the sign language and its effects in the education of the deaf. The practical application of his views is summed up in twenty proposals, of which the most salient points are: writing should be the basis and principal instrument of instruction to which all others—the manual alphabet, lip-reading and speech (which are both useful rather than necessary), pictures, and natural signs—are merely auxiliary, the last two to be employed with discretion; conventional signs are of no use whatever and positively harmful; the essence of the instruction of the deaf is in the logical teaching of language, depending on two conditions, intuition and co-ordination in such a way that one idea begets another; grammar should be taught first practically and inductively, and afterwards theoretically and didactically; the deaf should learn to read as soon as possible so as to profit by it.

J. J. Valade-Gabel (1801—1879) in the main followed de Gerando. At one time head of the Bordeaux Institution, teacher in that at Paris, and Inspector-General of Institutions for the Deaf, he was one of the most distinguished and enlightened instructors and authors of the last century, and his great work on the intuitive method received the approbation of the Institute. It is entitled *Methode a la portee des instituteurs primaires, pour enseigner aux sourds-muets la langue Française sans l'intermediare du langage des signes,* 1857. It was, however, his misfortune that his theories were much in advance of his time, so wedded were French teachers in general to the system of signs. His method, in brief, to use his own words, "repudiates both methodical signs and grammatical theories and processes; makes writing its principal instrument; instead of teaching the French language by translation, it teaches by intuition, as mothers do. It aims to produce on the eye of the deaf-mute, by writing, effects similar to those produced by speech on the ear of a hearing person. Although compelled to admit the language of natural signs for deaf children who are wholly deaf and have never spoken, it places that in a secondary rank, and thus succeds in putting them in a position to think in written words as we do in spoken words." This method everywhere in France modified the processes of the older ones, in some cases displacing them, and did much to prepare the way for the oral system. Valade-Gabel did not attach to speech that importance in his method that it has since obtained; in fact, he regarded it as an exceptional acquisition.

But speech, as a principal, if not an exclusive means in the education of the deaf was not without its advocates. One of the most prominent was Leon Vaisse (1807-1884), some time director of the Paris Institution, a post which, indeed, he resigned from want of support in his efforts to introduce oral teaching. Others were J. Hugentobler of Lyons, P. A. Houdin, and M. Magnat, but it is questionable whether the possibility of a close association of speech with ideas as the exclusive basis of education was fully apprehended by any French teacher of the period under consideration.

It was in 1879 that the change of systems was at last effected. It followed on the report of O. Claveau, Inspector-General of the Benevolent Institutions of France, who had been directed by the Government to visit foreign schools for the deaf and report on their methods with special reference to speech teaching. He also accompanied M. Franck, the official delegate of the French Government to the Milan Congress (q.v.), held in 1880. The result of their observations was entirely in favour of the pure oral method. It was therefore adopted in the institutions at Bordeaux and Paris, and so rapidly was the change made over the whole country, that in 1886, out of seventy schools, only five still practised the French system. It was a reform rather than a revolution, and in many cases it involved merely the substitution of speech for writing as the exclusive means of instruction.

Literature. The most brilliant of the new school of oral teachers which the change of methods called into existence was Ludovic Goguillot, who, in 1885, founded the *Revue Internationale de l'enseignement des Sourds-Muets*, a valuable periodical work that came to an untimely end after completing twelve annual volumes. He was also the author of what is still the principal French work of the kind, *Comment on fait parler les Sourds-Muets*, 1889, which is a complete practical exposition of the art of teaching speech, but not language. Its author's premature death, in 1890, was a great loss to France.

The principal organ of the education of the deaf in France is the *Revue Generale de l'enseignement des Sourds-Muets,* Paris.

SECTION II.—THE GERMAN EMPIRE.

Samuel Heinicke (1729—1790). Born at Nautzschutz, near Weissenfels, Heinicke at first assisted his father on his farm, but eventually left the paternal roof and entered the service of the Elector of Saxony as one of his bodyguard at Dresden. An increasing attachment to study, however, made him loth to remain longer in the army, which he then left, and having in the meantime married, he went to the University of Jena in 1757, and from there to Hamburgh in the following year. Here he remained until 1768 as tutor and secretary in the family of the Count de Schimmelmann, and then went to Eppendorf to take up the post of precentor, which he held until 1778. While at Dresden he had, about 1754, educated with some success a deaf boy, and now at Eppendorf he met with another whom he also educated, as well as several others. His fame in this work grew until he was in 1778 invited by the Elector Frederick Augustus of Saxony to Leipsic, where he founded the first school for the deaf in Germany, and the first recognized by any Government. On his death he was succeeded by his widow.

Some obscurity hangs about Heinicke's method of teaching owing to the fact that he, unlike the Abbé de l'Epée, concealed it is as far as he could, at any rate in regard to its details. Our chief sources of information are the correspondence with de l'Epée, already referred to under that head; Heinicke's own work, *Beobachtungen über Stumme (Observations on the Dumb)*, 1778, a series of letters of which only the first volume was published; and a pamphlet published in 1828 by his son-in-law and successor, M. C. G. Reich. One thing is quite clear from his letter to de l'Epée written in 1782, wherein he states, "In my method of instructing the deaf, spoken language is the fundamental point—the hinge upon which everything turns. By means of this, to which various classes of ideas are united, they acquire conceptions and proceed from the sensible to the intellectual. In a word, they think in sensations acquired by art, and by representations of things cohering with these sensations, which conjointly and separately influence their faculty of affecting and repugning, and produce the arbitrary cause of their thinking and acting."

Walther, the German historian of the education of the deaf, has summed the principles of Heinicke's method as follows:—

1. The knowledge of a thing precedes its naming. The education of the deaf must, therefore, proceed from intuitive instruction. Natural signs and pictures are suitable auxiliaries to such instruction.

2. Clear thought is possible only by speech, and, therefore, the deaf ought to be taught to speak.

3. Learning speech, which depends on hearing, is only possible by substituting another sense for hearing, and this can be no other than *taste*, which serves chiefly to fix the vowel sounds.

4. Although the deaf can think in signs and pictures, this is confusing and indefinite, so that the ideas thus acquired are not enduring.

5. They can also receive ideas by writing, but these can only be retained by the frequent repetition of the written words ; and by the help of the conceptions thus acquired they are capable of a certain degree of thought, but progress is slow, and the ideas thus formed are of a fleeting character.

6. The manual alphabet is useful, but, contrary to its ordinary use, it only serves to combine ideas.

7. The deaf can understand the speech of another from the motions of the lips.

8. As soon as they have learned to speak they should converse either with one another or with the hearing, and not use signs.

Heinicke was thus diametrically opposed to de l'Epée on the all-important principle, on which he insisted, that spoken words, not signs, must be the exclusive vehicle of thought and instruction, if the deaf are to be brought into direct relation with the world of ideas represented by spoken and written language.

His theory of taste as a substitute for hearing in the perception of sounds had a curious application in practice. He would give his pupils pure water for *a*, wormwood for *e*, vinegar for *i*, olive oil for *u*, &c., the better to fix these sounds in memory. Very probably Heinicke confounded *taste* with *touch*, on which, of course, the perception of sounds by the deaf chiefly depends.

Heinicke claimed to be the inventor of his method, and possibly in its inception such claim may be allowed, but it is unquestionable that he only gave a more logical application to the principles of previous workers, which, as we have seen, were not entirely unknown in Germany. He is commonly regarded as the father of the German or oral method, but this can only be in the qualified sense of being the first to give it a practical and established form. Moreover, his method had few, if any, adherents after him, one of the chief being his son-in-law and successor, M. C. G. Reich, who modified it so far as to admit of a larger use of natural signs. Another son-in-law, **E. A. Eschke,** was the founder, in 1798, of the Berlin Institution after it had been a private school for ten years, and went so far as to perfect the mimic language of his pupils, being persuaded that they could not have an idea for which they had not a mimic sign.

The partial failure of Heinicke's method to make good its footing in its native land is to be explained by the fact that the influence of the Abbés de l'Epée and Sicard, owing to the great publicity which, unlike Heinicke's, their method obtained, was very great in the German-speaking countries, and led to an alliance between the rival systems that, in some respects, is not unlike the combined system of the present day—an alliance that continued during the first thirty years of the last century. With the exception of a few, such as Beckedorff, who attributed to speech a direct influence on the intellect, German teachers of that time in general regarded it as having a secondary place as a means of mental culture, for which developed natural signs were necessary, but, on the other hand, although speech was thus reduced to a mechanical accessory, it was considered indispensable in order to give ideas that stability which they lacked when associated with mimic signs only, as well as to facilitate the use of the vernacular. Although some, following Heinicke, as Eschke, Reich, and Cæsar, gave a greater prominence to speech than others, as May, Venus and Schwarzer, the first two of whom succeeded the Abbé Storck at Vienna, they all agreed in employing the grammatical or formal method in teaching language—that by which the deaf scholar was required to commit to memory long lists of words, learn their declensions and the grammatical rules for their use, with examples, in the usual order, before he had the remotest notion of the use of complete sentences practically applied from the first. Such a method was, in fact, the reverse of that by which hearing children acquire language, and, as might be expected, the results were not satisfactory. W. F. Daniel, of Wurtemberg, was one of the first to protest, but in vain, against this in an excellent work published about 1825, although still regarding the sign language as essential.

Johann Baptist Graser (1766—1841). Dr. Graser, of Bavaria, holds an eminent position in the early history of the German system on two grounds. Firstly, by reason of his protest against the combined method, under which he held that the deaf acquired neither a complete knowledge of spoken language nor a good general education. Secondly, he was the prime agent—but not originator—in a movement which acquired great importance, having for its object to associate the education of the deaf with that of the hearing in the ordinary schools, instead of, as hitherto, in special institutions. In 1821, Dr. Graser founded an experimental school for the deaf as a department of an ordinary school at Bayreuth. The essential features of his scheme consisted in giving the deaf scholars a year and a half or two years of special training before entering the ordinary schools for the hearing; rejecting signs and the manual alphabet; teaching speech and adhering to the grammatical method. His views were set forth in a work published in 1829, *The Deaf-Mute restored to Humanity by Visible and Spoken Speech.*

Dr. Graser's new system was enthusiastically accepted, not only in Bavaria, but in other States, and the education of the deaf was made part of the public school system. Ordinary teachers taking up the work were required to have a previous training in a department specially created for the purpose in the normal schools or seminaries. Not only was the French system banished, but even natural signs were looked on with disfavour. But, as might be expected, the new system was foredoomed to failure, and some years after collapsed. The movement, however, did good in breaking down the exclusive character of deaf-mute education, and bringing the whole subject more within the general field of education.

Victor August Jäger (fl. 1825). Jäger was the principal of the Institution at Gmünd in Wurtemberg, and by the publication, during the fourth decade, of his work entitled *Guide to the Instruction of Deaf-mute Children*, did much to overthrow the combined method. He was entirely opposed to the manual alphabet and conventional signs as being injurious to the practice of speech, but allowed the initiatory need of natural signs. On the other hand, he not only practised the grammatical method, but carried it to great perfection. His influence in this respect was great, but only transient, and with him and those of his school the grammatical method perished, to give way to that of the modern German system inaugurated by Hill.

Friedrich Moritz Hill (1805—1874). The greatest of all educators of the deaf was a native of the Province of Breslau. The son of a military musician, Hill was trained for the teaching profession, receiving an excellent education, first under the celebrated Pestalozzi and afterwards at a seminary in Berlin. In 1828 Hill was one of several students selected by the Minister of the Interior to undergo a special training at the Berlin Institution for the Deaf, in accordance with Dr. Graser's scheme, and in 1830 entered the institution connected with the Weissenfels seminary, as teacher, where he spent the remainder of his life. For a long time he was greatly under the influence of the Graser idea of the generalization of deaf-mute education, as is apparent in some of his earlier works.

Hill's first important work appeared in 1838, under the title of *Guide to Deaf-mute Instruction*, which was followed in the next year by his *Complete Guide to the Instruction of Deaf-mute children in mechanical speech, lip-reading, reading and writing, for public school teachers*, and this in 1840 by one of the most valuable works in our special literature, the *Guide to the Instruction of the Deaf and Dumb, for Pastors and Teachers.* In 1866, Hill issued an exhaustive work of a critical character on the *Present Condition of the System of Deaf-mute Instruction in Germany.*

At the outset it may be said that Hill based his methods on those of the common schools, in other words, of pedagogical science. His watchword throughout his career was "Develop speech in the deaf child in the same way that Nature does in the hearing child." Other important maxims were—"Would you have the deaf attach the same importance to a correct use of language that the speaking do, you must make it a life study for them"; "Awaken in your pupils, above all, the feeling that language is a necessity to them"; "Would you succeed in this, introduce objects, and associate their names directly with the objects"; "Everything can be used to teach language." Thus at last the hitherto beaten track of grammatical teaching gave place to object teaching. Hill did not originate it, but reduced it to a science.

The chief features of Hill's method are first, the use he made of natural signs, and second, the manner in which the knowledge of spoken language is imparted to the deaf.

As to natural signs, Hill was firmly convinced of their necessity, but used them at the lowest stage of instruction only, making no attempt to give them an artificial development, and gradually replacing them by spoken language. "To banish the language of natural signs from our school-rooms would be like excluding from common schools the imperfect mother-tongue of the hearing child." Conventional signs and the manual alphabet Hill condemned, for the same reason as Jäger.

Hill's principles of language teaching may be expressed in the three following propositions:—

I The deaf have to learn language in the same manner in which hearing children acquire it.

This is what is known as the "mother's method"—the teaching of language by direct association with actual objects and actions—grammar being postponed until the latest stages of instruction. As an aid to this, Hill devised a set of charts, each containing sixteen coloured pictures of scenes of life, supplemented by a series of specially prepared readers. These charts were published as early as 1841, but Hill had been anticipated in this plan ten years by Joseph Piroux, of Nancy, who published a work with 500 plates for a similar purpose.

II. As with the hearing, so with the deaf, articulate speech must form the basis of language; writing, however, has to be treated as a secondary mode of expressing thought, wholly dependent upon the former.

By a loyal adherence to this principle, Hill believed that it would be possible to make speech a living organ of the reasoning faculties of the deaf and a direct vehicle of thought, and also to give lip-reading more reality. Speech and writing have thus the same relative positions as with the hearing.

III. Almost from the first we must use speech as a means of instruction and intercommunication with our scholars.

An obvious principle that needed stating, because under the old grammatical method it was believed that the deaf could not, nay, must not, practically apply spoken language until they had completely mastered it.

Hill's views entirely revolutionized the education of the deaf in Germany, and made Weissenfels the Mecca of teachers. It is to him that we owe what is distinctively called the "German system."

The object teaching method was conducted by German teachers on two different plans

(*a*). The separation of object teaching from language teaching. In this plan, the object lessons, though they employ speech as early as possible and are closely connected with the course of instruction in language, are distinct from the regular lessons in reading and writing. The teachers following this were (1) "empirics," who pursued the "natural," "intuitive," or "conversational" method of teaching language throughout the entire course; and (2) "systematists," who paid more regard to grammatical processes in the later stages of instruction. The first method was that followed by Hill and Arnold of Riehen, near Basle, a well-known instructor, who carried out Hill's principles far more thoroughly than Hill himself. He excluded signs altogether, not only from the schoolroom, but at all times. His school was regarded as the best of its kind in Europe, and in his later years he was looked up to as Hill had been. His views on the necessity of totally excluding signs cannot be regarded as practicable on a large scale, and the legitimacy of his mode of exclusion is at least open to doubt. The second method was represented, amongst others, by O. F. Kruse, himself a deaf-mute teacher of high attainments, who stood alone in advocating the cultivation and development of the natural sign language *pari passu* with speech. But he assigned to it only a subordinate place, and significantly remarks that "the deaf-mute becomes conscious of spoken words as an expression of thought sooner and more readily than of written words; hence the word must be based upon speech and not upon writing."

(*b*). The second plan is the union of object teaching and language teaching, as now followed by modern German teachers, represented by J. Vatter of Frankfort and E. Rössler of Hildesheim. This plan differs from the last in developing the mental powers of the deaf by object lessons *in and with* the teaching of language. These two leading teachers are both strenuous opponents of signs as a language, but Rössler admits the use of natural gestures and pantomime as a means of illustration. He is an "empiric," and Vatter a "systematist."

The leading principles of the German system have been summarised by Walther in his *Geschichte des Taubstummen-Bildungswesen,* 1882. We give here some of the more salient ones from a translation in the *American Annals*, which may prove of interest on other than historical grounds :—

1. Oral language is the principal subject of instruction from the beginning to the end of the course, and to this all other branches are subordinate.

2. In language teaching four stages are to be distinguished :—(a.) Preparatory language teaching—having for its aim the development of oral utterance and the fixing of elementary ideas. (b.) Fundamental language teaching—establishing a sure basis for further instruction, and accordingly providing the pupils with suitable objects for observation and language, and with simple forms of speech. (c.) The amplification of language teaching—treating language as a subject of instruction, extending the principles of object teaching, and arousing the self-activity of the pupil in speaking. (d.) The conclusion of language teaching—by continued grammatical exercises rendering speech more and more a conscious mental activity, leading the pupils to the comprehension of conversational forms and of simple popular literature, and enabling them to express in connected language and in writing their ideas of what they see, experience and feel.

3. In the language teaching of the deaf are distinguished :—(a.) A mechanical language teaching—having to do with its technical side. (b.) An object language teaching—providing the pupils with language materials. (c.) A formal language teaching—imparting the forms of speech. (d.) Free exercises in language—affording application and practice of colloquial language.

4. Simultaneously with language teaching are begun four exercises which constantly go hand in hand, viz., exercises in speech, lip-reading, writing and reading.

5. Since oral speech is at the same time the end and the means of instruction, it must receive the most solicitous care and practice throughout the whole course.

6. The clear and distinct utterance of single sounds and of the various combinations of sounds, the natural movements and positions of the vocal organs, the correct lengthening and shortening of sounds, the right emphasis of syllables and words, and the proper economy of the breath—the aim of mechanical speech—can be attained only by constant and conscientious effort.

7. Since it is not only essential that the deaf shall be able to make themselves understood, but it is of equal importance that they shall understand others, the exercises in lip-reading should receive no less attention than those in mechanical speech.

8. The principles generally followed in the acquisition of language by hearing persons are applicable to the instruction of the deaf in language.

9. Language should therefore be associated directly with the objects, phenomena, and circumstances environing the pupils. In this way alone can an intimate union of the word and thing be effected, and language be rendered for the deaf-mute what it is for the hearing person—an organic mental activity.

10. In order to accustom the pupils to an independent use of language the need of oral speech must be awakened within them.

11. The need of oral speech is not awakened in the deaf if those associating with them employ the sign language. The use of this language also produces the following injurious results: the deaf children use speech unwillingly, do not learn to read from the lips of others, do not acquire colloquial language satisfactorily, gain only a limited range of language, do not fully grasp the forms of spoken language, and do not learn to think in this language.

12. The sign language must therefore be excluded from the instruction of the deaf and from intercourse with them.

13. As a means of explaining language and imparting ideas, only the direct perception of the object or its representative in language should be employed.

14. With the first instruction in language should be associated a regular course of object teaching, which should be carried on either in connection with the instruction in reading and language or as an independent branch. It should continue throughout the whole school period.

15. The aims of object teaching are: the quickening of the attention, the exercise and development of the faculties of observation and reflection, the acquisition of ideas and facts, the use of significant words, practice in the employment of language already acquired, and its further development by oral conversation and written exercises.

16. Object teaching is: (a.) Preparatory—going hand in hand with articulation teaching. (b.) Fundamental—furnishing material to the pupils. (c.) Descriptive—by desciptions of various objects aiming at the enrichment of language material, and the comprehension and correct use of the forms of language. (d.) Practical—seeking, in connection with progress in language, to acquaint the pupils with the practical relations of life.

17. The order in which the sucession of objects is to be presented is determined by the circumstances of time and place.

18. Since the deaf-mute receives language under limited conditions and is slow in reaching accuracy in its use, the laws of language, to be comprehended and mastered, must be acquired partly by practice and partly by observation.

19. Although the need of language on the part of the pupil continues the leading motive in the development of his language,

yet there must be a systematic progress in the presentation and practice of the forms of speech at every stage of the course of instruction.

20. In the later stage a regular course of instruction in grammar begins, for which the pupil has been prepared during the middle stage, making language itself the subject of treatment.

21. The forms of language are taught in connection with the reading book, but there may also be special lessons for this branch.

22. This branch of instruction can produce fruitful results only when it follows the maxim: Deduce the rule from the example.

23. In order that the deaf may acquire the power of expressing themselves correctly and freely in writing, they should be led to keep a diary, from which in the later years of school may be developed exercises in composition, imparting facility in letter writing. Moreover, every subject of instruction, so far as it has to do with the succession of ideas, must be made to contribute to the expression of ideas in writing. Written exercises must therefore be duly associated with oral instruction.

24. The free language exercises introduce colloquial language as it is used in the every day intercourse of life.

25. These exercises are connected with the immediate wants of the pupils, and seek to provide therefor. Occurrences at home and school, during walks and mutual intercourse, are made the subject of conversation, and afford practice in colloquial language, especially in its peculiar forms and idioms.

26. These exercises constantly give the pupil complete forms of language, without always considering whether the form employed has been prepared for and is fully understood.

27. Since it is of high importance for the deaf to learn colloquial language as comprehensively as possible, this aim must be considered in every branch of study whenever opportunity offers. What has been learned should also be applied in intercourse out of school.

28. Every subject of instruction must teach the language peculiar to itself; it enters, therefore, into the service of language teaching.

29. The entire course is based on speech. The written form is added as needed.

30. From the beginning of the middle stage the method of deaf-mute instruction resembles more and more closely that of the ordinary schools for the hearing, so that in the higher stage it does not differ from it at all.

German Criticism of the German System.

The method of education followed in Germany has, in recent years, not been without its critics, the principal and ablest of whom is J. Heidsiek, of the Breslau Institution for the Deaf, who has explained his views at great length in his *Der Taubstumme und seine Sprache (The Deaf-mute and his Language)*, 1889, a work that excited great interest and energetic protest, not only in Germany, but also abroad. Heidsiek, basing his attack on the German system on the theory that oral language being in its nature and function intended solely for the ear, contends that to make the eye take the place of the ear in this connection is a violation of the laws of nature and a physical and psychical impossibility, and hence that it is impossible to make the deaf communicate and think in speech *alone*. Oral teachers are charged with considering language in its material rather than its psychological nature, and disregarding the fact that, though the deaf possess the giving and constructive part of the mechanism of speech, the perceptive and receptive portion is wanting. They are also charged with refusing to recognize the patent fact that gesture alone can be to the eye what speech is to the ear, and that to the deaf, who have no conception of sound as such, articulate language is in reality a most laborious and arbitrary system of gestures addressed to the eye. Heidsiek concludes that signs should and must be employed in the school. Heidsiek's view of the purely mechanical character of speech in the deaf is not supported by the experience of the more highly educated of them, and at most is true only is those cases where the intellectual development is of too low an order for speech to become effective as a vehicle of thought and an instrument of reason. He is himself inconsistent with his own premises, since he favours oral instruction, aided by gestures, for those capable of it, and not only that, but after a visit in the United States, a few years ago, he has modified his view of the value of the sign language as part of the course of instruction and embodied his new ideas as follows:—

1. In order to bring the deaf to a mastery of verbal language in the shortest way, and to render the sign language superfluous, separate instruction in speech and language should be maintained.

2. The instruction in articulation and lip-reading should begin on entering school and continue through the whole course.

3. Instruction in language should be based upon the manual alphabet and writing, and should precede instruction in speech.

4. The manual alphabet should be used as a means of instruction and intercourse during the whole school life, but in the upper classes it should be withdrawn more and more in favour of speech.

5. Pantomime, or action, for purposes of illustration, should be used freely at all stages of the school course.

6. The conventional sign language, however, should be rigorously excluded, and should neither be employed as a means of instruction nor tolerated as a medium of intercourse.

7. Since speech, finger spelling and writing are forms of verbal language, and all have the same end in view, viz., to give the deaf command of verbal language, we have but one name for this method—*The Verbal Language Method.*

Although Heidsiek's arguments against the German system, or rather its exclusive use with *all* the deaf, are based on erroneous views of the psychological relations of speech and mind in the deaf, he has none the less rendered an indirect service in showing the practical impossibility of securing uniformity of method regardless of individual capacity; nor do his views affect the main issue as to the feasibility of speech for the deaf, apart from its mental uses, which he fully admits.

We must here cross the border into *Holland* to notice an instructor of more than national repute—D. Hirsch (1813-1895), Director of the Rotterdam School for the Deaf for some thirty-five years. A consistent and firm supporter of the German system (including a limited use of natural signs), Hirsch condemned the combined system as the worst of any, since vocal language, to acquire its full import for the deaf, must be the primary form in which their ideas are to be clothed, and therefore neither signs nor writing ought, on this account, to replace spoken language.

Literature. The principal work on the education of the deaf in Germany is *Handbuch der Taubstummenbildung* (Berlin, Staude, 1895), by Eduard Walther, whose historical work has already been referred to. To this may be added the following, by J. Vatter, *Die Ausbildung des Taubstummen in der Lautsprache*, and *Der Verbundene Sach-und Sprachunterricht* (both published by Bechhold, Frankfurt).

The principal organ of the education of the deaf in Germany is *Blätter für Taubstummenbildung*, Berlin.

SECTION III.—THE BRITISH EMPIRE.

Thomas Braidwood (1715—1806). Braidwood should properly be included in the last chapter, but the close connection of his family with the beginnings of public school education in England renders it more convenient to commence this section with him.

A native of Scotland and educated at Edinburgh University, Braidwood opened a mathematical school in that city, but in 1760 a boy, Charles Sherriff, born deaf, was placed with him, with a view to his learning writing only. In a few years, however, Braidwood had succeeded in teaching him to speak and understand language, and encouraged by this, henceforth devoted himself to the education of the deaf, in which he associated his son John. In 1783 the Braidwoods removed their school to Hackney, London, where it was carried on by Thomas' widow and son after his death, and by his son's widow after the death of both of these.

Considering that the education of the deaf was the profession of his life, it is perhaps not surprising that Braidwood, from interested motives, never published any account of his method. His work, however, attracted the attention of many eminent men of the time, such as Arnot, the historian of Edinburgh, Lord Monboddo the philologist, Thomas Pennant the traveller, and Dr. Johnson. Pennant, in his *Tour in Scotland*, describes a visit he paid to "the extraordinary professor's" school in 1772, in which he alludes to the deaf as "conceiving by intuition, seeing our words, and speaking by imitation." Dr. Johnson, in his *Journey to the Western Islands of Scotland*, also describes a visit he made to the school in 1773, referring to it as "a subject of philosophical curiosity," which seems to have made a profound impression on him. He says of the lip-reading of the scholars, "that it is an expression scarcely figurative to say, they hear with the eye"; he remarks on their accuracy in spelling, and the reasons for it; and closes with these notable words, "it was pleasing to see one of the most desperate of human calamities capable of so much help; whatever enlarges hope, will exalt courage; after having seen the deaf taught arithmetic, who would be afraid to cultivate the Hebrides?"

But our chief authority in regard to Braidwood's method is the father of one of his pupils, Francis Green, an American gentleman, who had sent his deaf son in 1780 to Braidwood, and had himself afterwards visited the school. In 1783, while residing in London, Mr. Green published "*Vox Oculis Subjecta*"; *A Dissertation on the most curious and important art of imparting speech, and the knowledge of language, to the naturally deaf, and (consequently) dumb; With a particular account of the Academy of Messrs. Braidwood, of Edinburgh.* The Latin title, it may be explained, was Braidwood's motto. From this and the others referred to, we learn that Braidwood first began with exercises in articulation, and then associated the spoken words with their written and printed forms, as well as with the objects and qualities signified, their proper use according to grammatical rules coming next. Mr. Green states that Braidwood held that "articulate or spoken language has so great and essential a tendency to confirm and enlarge ideas, above the power of written language, that it is almost impossible for deaf persons, without the use of speech, to be perfect in their ideas." His method was, thus, in the main oral, being Wallis' in a more developed form, and natural signs and the manual alphabet were apparently not excluded as useful aids.

Joseph Watson, L.L.D. (1765?—1829). Dr. Watson was a nephew of Thomas Braidwood, and was educated by him at Hackney, and having under his influence resolved in 1784 to embrace the instruction of the deaf as a profession, he afterwards became the principal of the "Asylum for the Deaf and Dumb" in the Old Kent Road, London—the first English public school for the indigent deaf established. This institution owed its origin to the benevolent interest of the Rev. John Townsend, a distinguished Congregational minister of Bermondsey, who had become acquainted, in his ministerial capacity, with a lady, Mrs. Creasy, whose son was deaf, and had been a pupil of the Braidwoods. This lady so far interested Mr. Townsend in the subject that he resolved to found a charitable institution for the education of the deaf. He succeeded in interesting the philanthropic Henry Thornton and the Rev. Henry Cox Mason, rector of Bermondsey, in the scheme; subscriptions were obtained, Dr. Watson's services secured as instructor, a society formed to carry it out, and in November, 1792, the new school was opened with six children. The number grew rapidly until in 1809 it amounted to seventy. In 1862 a branch school was opened at Margate, Kent, but the present Institution was not begun until 1874, and opened in 1875.

The method of education followed by Dr. Watson was explained and published in 1809 in his *Instruction of the Deaf and Dumb* (2 vols.). He states that it is founded on the same principles as those of his uncle, Thomas Broadwood, who in turn had founded his on Wallis'. His views are presented under the heads of *Articulation*, *Writing*, *Reading* and *Knowledge of Language*, and the method may be best described as a combined one. Many of Dr. Watson's observations are excellent. He condemns the methodical signs of de l'Epée in unmeasured terms, calling them "fanciful and useless." "Would it not be a more natural and rational mode of procedure for the teacher to begin by watching the objects and occasions to which his scholar applied the words of his barbarous speech; that, by knowing *these*, he might gradually substitute the words of the language to be taught; using the *former* only as an introduction to the latter?" From this the place of natural signs in the course is evident. "Our first step (in teaching him the vernacular of those who hear) is teaching him articulation—so highly useful as a medium in the attainment of an important end, the acquisition of language. In learning the letters, a very important operation is going on in the mind of a deaf person: I mean the association, in the memory and understanding, of the figures of written or printed characters, with certain movements or actions of the organs of speech. The very habit of regarding the one as the representative of the other, paves the way for considering combinations of those actions, or characters, as the signs of things, or of ideas; that is, significant *words* written or articulate. We, who hear, consider words chiefly as *sounds*; the deaf, who have learnt to speak, consider them rather as actions proceeding from themselves. And this gives language, to them, a sort of *tangible* property, which is of vast importance, both as respects its retention in the memory, and as respects one of its important uses—the excitation of ideas in their own minds." In the learning of language, Dr. Watson observes "I have no hesitation in saying, that naming perceptions, as they arise, without regard to metaphysical or grammatical distinctions, is the only sure and direct road to the acquisition of a language by the deaf." After a vocabulary has been acquired, "we proceed to the construction of short sentences, without learning the rules of syntax!" The method of induction, or learning by example, is employed instead, and also direct association with all actions and their relations. Although Dr. Watson mentions lip-reading, he apparently does not regard it as of much practical importance, and recommends the two hand manual alphabet—which is figured—as a help to ready communication. Dr. Watson's work is of interest as the first English work of its kind published since Dalgarno's *Didascalocophus,* and though far from exhaustive, exhibits a closer insight into the problems of the deaf in their relation to the hearing world than de l'Epée's, or even Sicard's, while in his method of teaching language he employed the grammatical process less rigorously than his German contemporaries.

Continuing our brief notes of the Braidwood family, John Braidwood, the son of Thomas Braidwood's son John, took charge of the next institution to be founded in 1810 at Edinburgh, where he remained only two years and then went to America, but owing to his intemperate habits, his efforts to establish schools there came to nothing. The Edinburgh school was next under the charge of Robert Kinniburgh, who was bound by a so-called bond to the Braidwood family not to reveal the method of instruction into which they had initiated him; an obligation that ended in 1819. The next institution after this in point of time is the Royal Institution at Edgbaston, Birmingham, founded in 1814, of which Thomas Braidwood, another son of the elder John was principal until his death in 1825. Dr. E. M. Gallaudet, writing of the Braidwoods, says: "To this family the honour evidently belongs of having made the general education of the deaf and dumb a practical measure in the British Empire. No meed of praise is, however, to be accorded to the Braidwoods for disinterested benevolence. On the contrary, their work, effective and important though it was, appears to have been purely of a business nature . . . . They were determined to secure the practice of their art as a family monopoly, and to derive from it all the pecuniary advantage possible . . . . During the fifty-nine years that deaf-mute instruction in the British Isles was a monopoly of the

Braidwoods, but three public institutions were established, whose managers were under bonds to abstain from extending a knowledge of their art." This censure, severe as it is, is not undeserved, but on the other hand it is misleading to speak of the exclusiveness of the Braidwoods as a "monopoly." They never had any monopoly in the education of the deaf; they were simply the only ones in this field of activity. Dr. Watson was not deterred from publishing his work in 1809.

John Pauncefort Arrowsmith in 1819 published a work, *The Art of Instructing the Infant Deaf and Dumb*, to which is appended the translation of de l'Epée's work issued by Green in 1801. It is an account of an interesting and original attempt to educate the author's deaf brother at home, but the details are not important enough to detain us. Arrowsmith is, however, remarkable as being the first to advocate the instruction of the deaf in the ordinary schools for the hearing in opposition to special institutions.

Charles Edward Herbert Orpen, M.D.—To the practical efforts of this benevolent physician of Dublin, dating from 1816, is due the first institution in Ireland, established in 1819 at Claremont, Glasnevin, in that city, with Joseph Humphreys for its first master. But besides his practical work Dr. Orpen was also the author of *Anecdotes and Annals of the Deaf and Dumb*, 1836, a miscellany of information respecting this class of a popular character, and possibly the first of the kind in any language, Green's being too special to come under that description.

During the Braidwood *regime* considerable attention was paid to articulation as a part of the system of education pursued in the earlier part of the century, a fact Arrowsmith animadverts on, but the French system soon gained the ascendancy and prevailed for about half a century from 1825.

The other principal British voluntary schools and institutions with the dates of their foundation and the names of their first principals will be found in the list at the end of this section.

Charles Baker [Ph. D. *Gallaudet College*] **(1803—1874).** A native of Birmingham, Charles Baker became an assistant teacher at the Institution there in 1826. In 1829 he was appointed head-master of the newly founded Yorkshire Institution for the Deaf at Doncaster, which office he held until his death. During his long tenure of forty-five years, Baker was well known and looked upon as one of the leading English teachers, a position he to some extent merited from his efforts, in the earlier part of his career, to place the education of the deaf on a more satisfactory footing at a time when public interest in it was of the most limited and capable men for the work were scarce. But little more can be said, for Baker, notwithstanding his literary activity, hardly ever did anything to advance the theory and practice of deaf-mute education, and to the last adhered to the French system, for although not opposed to instruction in speech in favourable cases, he regarded it as in general but a "specious acquirement." Apart from his ordinary work for the deaf, his chief title to fame rests on his numerous school class books, which in their time met a real want, the most important being the *Circle of Knowledge*, in four gradations, first issued about 1840, which had a large circulation and was translated into several languages.

James Scott Hutton [M.A. *Gallaudet College*] **(1834—1891.)** The little province of Nova Scotia was the foremost among the British Colonies practically to recognise the claims of the deaf in the opening of a school at Halifax in 1856, of which Hutton, who was a Scotchman, and had been a teacher for ten years in the Edinburgh Institution, became the Principal in the following year. He held this office till his death, with the exception of four years at the Ulster (Belfast) Institution.

Hutton was one of the best of the earlier British teachers, and by his text books, his clear, if not always sound views, and his able conduct of the school did much to advance the education of the deaf in the Dominion of Canada. He followed what he called the *natural* *system*, i.e., the assimilation of the process by which the deaf are instructed in language to that by which the hearing child acquires his mother's tongue, and the means employed were natural signs, designs, writing and the manual alphabet. A knowledge of written language was the great object aimed at, and Hutton held that the process by which it was acquired was not one of *translation* but of *creation*—the gradual embodiment of thought in words—and the same in kind as that by which the hearing acquire their mother tongue. He refused to follow the grammatical method, believing that language should be learnt from examples presented in some real practical connection rather than from rules, and that the synthetic ought to precede the analytic, and the comprehension of language its practice. To this end he attached great importance to its close association with living facts and acts, dramatic representation being superior to pictures, useful as these are, in fact the schoolroom should be made a *microcosm of life.* The natural sign language he regarded as *thought visible* and indispensable throughout the course.

William Robson Scott, Ph D. (1811—1877.) Dr. Scott, for thirty-six years Principal of the West of England Institution at Exeter, deserves some notice, as one of the few English writers who have produced anything on the theory and practice of deaf-mute education in a comprehensive manner. His work *The Deaf and Dumb, their Education and Social Position*, appeared in 1870, and fairly reflects the views of the older school of English teachers led by Charles Baker, by whom Scott was trained. The keynote of the book is given in these words, "It is not on the deaf-mute's being taught to articulate that his capability to reason depends, but on his being a member of the great family of human beings who have minds capable of reasoning." Dr. Scott, believing that speech, although desirable as a purely mechanical accomplishment, was of little or no use in developing the reasoning powers of the deaf, based his method on alphabetic or written language, assisted by natural signs, which he is careful to state repeatedly are a means only, never an end, and can never fill the place of speech or writing in accuracy and precision. Language he taught by combining the colloquial with the systematic method, just as is the case with ordinary children, so that the deaf scholar is introduced at once to the full and complete sentence without being burdened with single words and grammatical rules, special explanatory lessons being substituted.

The German or Oral System in England. In the "sixties" of the last century the French system had become so dominant in all British schools that we find it stated in a paper published in the *Quarterly Journal of Science*, 1865, that "the articulation of the deaf and dumb is of rare occurrence in this country." The author of this paper, Mr. Gerard Van Asch, who had been a teacher at the Rotterdam school, had been in England for some time teaching privately by the German system, and he was the first to practice it in this country. The first school to employ the system was the Jews' Deaf and Dumb Home, London, founded in 1866 by the Baroness Mayer de Rothschild, of which Mr. William Van Praagh, who had also been trained at the Rotterdam School, was the Principal. After an interval, he was succeeded in 1872 by Mr. S. Schöntheil, a teacher trained by J. Deutsch, at the Jewish school at Vienna, where the combined method was practised. But Mr. Schöntheil had early in his career a strong predilection for the oral method, which he successfully carried out at the Jews' Home for twenty-two years. As this school was visited by many English teachers, who were greatly impressed by the results they saw, Mr. Schöntheil's influence in the spread of the German system in this country was not inconsiderable. Amongst them were Mr. John Barber, a private teacher, and the late Andrew Patterson, head-master of the Royal Schools at Manchester, who towards the end of a long life in that capacity introduced the oral system into these schools in 1882—this department being placed under Walter S. Bessant, who afterwards as head-master was one of the most influential and consistent supporters of the system, and whose premature death in 1900 was greatly deplored. But the first Institution to employ the oral system was the Yorkshire at Doncaster, where it was introduced in 1876 by Mr. James Howard, the present head-master, under the influence of the Abbé Balestra, of Italy. Mr. Howard has done much in an unostentatious manner to promote the system in this country. At the Margate Institution oral classes were first started in 1881 by Dr. R. Elliott. Another pioneer of oral teaching in this country is Mss Susanna E. Hull, who had begun the private education of the deaf in 1862, but her method was more a combined than oral one, in which lip-reading was hardly recognised, and it was not until 1873 that she adopted the German system in its entirety.

Thomas Arnold (1816—1897.) But the foremost place as one of the earliest and most successful English oral teachers undoubtedly belongs to Thomas Arnold who if he did not fill the most conspicuous place, and if his experience of the deaf as a class was comparatively limited, was nevertheless in point of merit one of the best teachers of his time, and certainly the chief English writer on the education of the deaf. A native of Co. Antrim, Ireland, but of English extraction, Arnold's interest in the deaf was first roused, when a young man, by a deaf lad of his neighbourhood whom he made some attempt to teach. He eventually became an assistant teacher in the Institution at Doncaster under Charles Baker in 1840, and while there he made a not unsuccessful effort to teach speech to a class, but want of sympathy and unfavourable circumstances put an end to it. Arnold did not remain more than two or three years, as, having in the meantime embraced the tenets of the Congregationalists, he had decided to enter the ministry of that body. After filling pastorates at Burton-on-Trent, Smethwick and Sydney (Australia), Arnold settled down at Northampton in 1860 as pastor of the historic Doddridge Chapel, a position he resigned in 1881, in consequence of the increasing claims of his work for the deaf, but he continued to reside in that town until his death.

Since leaving the Doncaster Institution for another sphere of work, Arnold had never wholly lost his interest in the deaf, and had always believed in the value and possibility of oral teaching. In Australia, and at Northampton for a short time after settling there, he had taught the deaf son of an influential man in the Colony by that method, but his career as an oral teacher properly dates from 1868, when he undertook the education of another deaf boy. So successful was Arnold not only with his oral instruction, but also in passing him through the Cambridge University Local Examinations and the London University Matriculation, that he took in other pupils, and as the result of mature study and experience, decided to publish his methods. His first publication was a pamphlet, issued in 1872, on *The Education of the Deaf and Dumb, a Review of the French and German Systems*, which was followed in 1881 by his first important work, *A Method of Teaching the Deaf and Dumb Speech, Lip-reading, and Language*, supplemented later by four essays, of which the most important is on preparatory education. The first really comprehensive English manual, and based on sound principles systematically applied, it marked a great advance in our special literature. In 1885, on the establishment of the College of Teachers of the Deaf, Arnold was induced to aid its objects by bringing out another manual, which was issued by that body in 1888 under the title of *Education of Deaf-Mutes: a Manual for Teachers*, a work of more extended scope and fulness of scientific treatment, and of undoubted practical value, despite a diffuseness due in part to his habit of treating most subjects from a philosophical standpoint. He supplemented this by issuing on his own account in 1891 a bulky work with the same title as the last, of which it, in fact, formed the second volume, in which the historical part of the first was continued and the subject of language more fully discussed. Acute and interesting in its views on the work of others, its utility as a scholarly work of reference is unfortunately somewhat marred by being unwieldy in plan and execution. Arnold also issued the following thoughtful pamphlets :—*Lip-Reading*, 1892 ; *Defects and Impediments of the Organs of Speech*, 1893 ; *The Languages of the Senses*, 1894 ; *Analogies of the Language of Sound and of Touch* (undated, but the last).

The present work being Arnold's in a new form, we need not describe in detail his method. Although in the practical details of oral teaching he struck out a line of his own, in principle he was in accord with the leading Continental masters, especially at first Hill, but he modified his views to such an extent as to find himself more in agreement with the pure oral method of the Abbé Tarra. He was, however, no slave to system, and always held, on grounds of expediency and common sense, that an oral teacher should use his discretion in regard to the employment of natural signs, especially at the initial stage, nor did he suppose the method, even if applicable to *all* the deaf, capable of equal results. He attached great importance to the function of the sense of touch in establishing, in the absence of hearing, a living connection of speech, as a mechanical operation, with the cerebral activities, thus rendering speech as *natural* for those of the deaf capable of it as it is for those who hear ; and to a careful training in lip-reading, the elements of which he analysed with a minuteness that almost went beyond practical necessities.

Mr. H. N. Dixon, his successor in the school at Northampton, has well summed up Arnold's work in the following words : "No English writer has done so much to unfold and analyse the principles underlying the education of the deaf, to systematise its methods, and to chronicle its development ; while as regards the oral system he has given us by far the most philosophical and searching exposition of its principles and claims that we possess. . . . . . His writings are of the analytical and deductive order ; his vein was a philosophical one, and he always chose to search out the underlying principles of things and thence to deduce the true method of their practical application, rather than to generalize from observed facts. Indeed, one is rather struck by the comparative absence from his writings of conclusions based on his own experience as a teacher. Even when he deals with the practical details of teaching, his rules and suggestions are usually founded upon an application of principles he has previously evolved on general considerations. This gives a logical sequence and a general roundedness and completeness to his system of teaching which is its main characteristic, and which does not lose its value from the fact that in practice deviations from the lines laid down are often necessary. . . . . . To have placed a system of education, which was, as he found it, almost entirely an empirical one, on a sound and philosophical basis, and to have demonstrated by his own teaching its practical value, is no unworthy result of a life's work; this, among many other labours, it may fairly be claimed that Arnold has done for the Oral System." *(Northamptonshire Notes and Queries, Vol. 6.)*

Association for the Oral Instruction of the Deaf and Dumb. This society owes its origin to the benevolent interest of the Baroness Mayer de Rothschild, who, having convinced herself of the superiority of the oral system carried on by Mr. W. Van Praagh at the Jews' Home already referred to, and being desirous of extending its advantages more generally, founded in 1870 a society with the object of establishing a training college for teachers of the deaf by that system, which should also be a practising school where the deaf of all classes, irrespective of creed, and paying fees regulated according to their position, could be taught. In 1872 the new Association took a house in Fitzroy Square, London, and Mr. Van Praagh was appointed Director of the new college and practising school. Mr. Van Praagh, who is a firm believer in the pure oral method, in 1894 founded the "Union of Pure Oral Teachers."

Society for Training Teachers of the Deaf and for the diffusion of the German System. This society was founded in 1877 by Mr. B. St. John Ackers, for the purpose of training and supplying English teachers on the German system. Mr. Ackers' interest in the subject was due to his having a daughter who had lost her hearing, and on whose behalf Mrs. Ackers and he spent two years in travelling in Europe and America collecting information as to the merits of the various methods of education, with the result that their entire sympathy and approval were won for the German system. The society opened a training college at Ealing, London, in 1878, with which was associated a practising school for the deaf, and Mr. Arthur Kinsey was appointed the principal. Mr. Kinsey, who had been selected by Mr. Ackers for that post, had previously studied the subject with him for some time, and was then sent by him to receive special training under Rössler at Osnabrück, in Hanover, afterwards visiting the principal schools for the deaf in Europe and America. He died in 1888. Like the one last mentioned, the efforts of this college are exclusively directed to the practice and propagation of what is now more usually known as the pure oral method. Pupils in the school pay fees, but special provision is made at a branch for the indigent.

College of Teachers of the Deaf and Dumb *(Incorporated.)* The idea of bringing teachers of the deaf into some kind of union for mutual benefit had been mooted, and a practical beginning in this direction had been made by the late Dr. William Stainer, Superintendent of the London School Board Classes for the Deaf; but, acting on the suggestions of several leading men in the profession, the idea was further developed into that of a corporate body, admission to which was to be made conditional on an examination. In this way the College of Teachers came into existence in 1885. The credit of successfully carrying the scheme through undoubtedly belongs to Dr. Richard Elliott, Head-master of the Old Kent Road

(London) and Margate Institutions, who, throughout, had the active co-operation of Dr. Stainer; in fact, these two may fairly be regarded as the virtual founders of the College.

Hitherto, teachers of the deaf had been an isolated class, with no acknowledged status, and one of the chief objects of the College was to remedy this by raising the teaching of the deaf to a recognized profession, and maintaining a common standard of excellence by granting certificates of competency as the result of an annual examination. Although its functions are purely those of an examining society, the College, unlike the two others, is not pledged to any particular system of education or dependent on public support; a fact which gives its objects, if fully carried out, a character of independence and comprehensiveness that is inevitably destined to render it the most important body of the kind in the Empire.

The Elementary Education (Blind and Deaf Children) Act, 1893. In the British Isles the education of the indigent deaf in institutions was for long entirely dependent on private charity, and it was not until 1862 that an Act, followed by others in 1868, 1879, and 1882, contained provisions empowering Boards of Guardians either to pay for the instruction and maintenance of the indigent deaf in an institution or to give an annual subscription to its funds, powers which, however, only became practically effective after the general Education Act of 1870 had given an indirect impetus. The great objection to such legislation was the stigma of pauperism which unavoidably attached itself to such cases as came within its cognizance and it was availed of only to a limited extent. Following on the Act of 1870, the late Sir W. St. John Wheelhouse made unsuccessful attempts in Parliament in 1871 and 1872 to obtain State education for the deaf. But that Act did not expressly except the deaf from its provisions, and taking advantage of this fact, the London School Board in 1874 instituted deaf classes in some of its schools, under the superintendence of

Dr. W. Stainer, an example that was followed by the School Boards of a few of the principal towns, but the difficulties attendant on the day school system, as applied to the deaf, prevented any extensive adoption of the plan until, at all events, after the Act of 1893.

In 1885 a Royal Commission was appointed to inquire into the general question of the education of the blind, and in the following year the terms of reference were extended so as to include the deaf within its scope. After an exhaustive inquiry the Commissioners issued their report in 1889, and as was fully expected recommended the extension of the ordinary Education Acts to the deaf. From our point of view two of the most important recommendations, with a reservation on the part of two of the Commissioners, are that all deaf children should have "full opportunity of being educated on the pure oral system"; and that the class should be spoken of as "the deaf" and not as "deaf-mutes" or "deaf and dumb," unless they were actually so. In 1890, an Act was passed making provision for the education of the deaf in Scotland only, but it was not until 1893 that the Act for England and Wales was passed and became law the following year. It provides that every deaf child shall receive an education and be maintained either in an existing institution, or in one to be provided by the local school authority, and that the term of such education is to extend from the completion of its seventh to its sixteenth year. But it wisely made no enactment in regard to the methods of education to be employed. Thus at last the right of the deaf to a share of the education to which their hearing fellows are entitled was recognised by the State, and this fact in itself marks a vast advance on the old view that regarded them as the special objects of a compassionate charity. The North Staffordshire Blind and Deaf School at Stoke-on-Trent is the first residential school that was opened in 1897 under the new Act, followed by others at Leeds, London ("Homerton College"), and Bristol—the two last being old buildings taken over for the purpose.

National Association of Teachers of the Deaf. For a very long time teachers of the deaf had scarcely any opportunities of meeting for the exchange of views and the promotion of an *esprit de corps*; in fact they lived a more or less isolated life under the narrow and unprogressive influences of the charitable and local ægis under which their respective schools existed. Informal conferences of headmasters and others interested in the work were held at rare and sometimes considerable intervals—the first being in London in 1851—but although interesting and profitable, they had neither a representative nor a permanent character. Under the circumstances, at the fifth of these conferences, held in London in July, 1895, it was decided, on the initiative of the late Mr. W. S. Bessant, Headmaster of the Royal Schools at Manchester, and one of the strongest and most successful men in the profession, to organise the whole body of British teachers into a permanent association on a comprehensive basis. The new body met for the first time the following December. Its success was well assured from the outset, and it has already held two biennial conferences at Glasgow (1897) and Derby (1899). An important result of its activity was the establishment in 1897 of the Arnold Library as a memorial of the great teacher and author of that name.

British North America. We have made special mention of J. Scott Hutton on account of his eminent qualities as a teacher, but we must now glance at what remains to be told of the education of the deaf in this part of the world. The first school was started at Quebec by Ronald Macdonald in 1831, at the desire of the House of Assembly of Lower Canada. Macdonald, who was trained at Hartford by Clerc, only continued the school until 1836 owing to lack of adequate support from the public funds, and it was not until 1848 that the first institution in Canada, now the "Catholic Male Deaf-Mute Institution for the Province of Quebec," was opened at Montreal by the Abbé Lagorce, who had been partly prepared for his work by Macdonald. This was followed in 1851 by the "Catholic Female Deaf and Dumb Institute" in the same city, the Halifax Institution in 1856, as already noticed; the Ontario Institution, Belleville, 1870; the Mackay Protestant Institution, Montreal, 1870; the Frederiction (New Brunswick) Institution, 1882; and the Manitoba Institution, Winnipeg, 1888.

Attention was early given to the teaching of articulation in Canada, and in 1871 the Rev. A. Bélanger introduced what he then called "the German method, helped by the language of signs," *i.e.*, the combined method, into the Montreal Catholic Institution, of which he was the Director. The proportion now taught speech is high: of a total of 779 pupils in the seven schools in Nov., 1900, 425 were taught speech, of whom 242 were taught wholly or chiefly by the oral method.

Australasia, India, and South Africa. In far off Australia the first institution for the deaf was established at Sydney about 1860, being followed in the same year by one at Melbourne, and by another in 1874 at Brighton, near Adelaide. In New Zealand, a Government school was established at Christchurch in 1879.

In India, largely through the efforts of the late M. de Haerne, some time Director of the Brussels Institution, the first school was started by the Catholics at Bombay in 1884, under the direction of Mr. T. A. Walsh, who introduced the oral system. But not until 1893 was a native school started at Calcutta by Mr. S. N. Sinha, which is now under Babu Jamini Nath Banerji, who had been a normal student at Gallaudet College. In this vast country, with its teeming millions, there is yet ample scope for educational work among the deaf.

In South Africa there is an oral school at Worcester, Cape Colony, in charge of Mr. B. J. G. de Labat, where both English and Dutch are taught. Some provision is also made for the education of the deaf at Capetown, in connection with St. Bridget's Roman Catholic Mission, and at King William's Town at the Convent Mission School.

Methods and Literature. During the last quarter of the last century oral methods of education made rapid progress, as will be seen from the figures in the list of schools, and at the present time a great majority of the deaf of school age are instructed in speech and lip-reading by either the oral or combined method. In the former method the schools at Margate (1881), Manchester (1882), Doncaster (1876), and Boston Spa from the first took the lead; while the other is favoured chiefly by that at Glasgow and two or three other places. Private instruction is almost without exception wholly oral.

The only important general work besides Arnold's that has recently been published is *Deaf-Mutism, a Clinical and Pathological Study, with chapters on the education and training of deaf-mutes* (1896), by Dr. J. Kerr Love and Mr. W. H. Addison, who advocate the combined method. Mention must also be made of the *Quarterly Review of Deaf-mute Education*, started in January, 1886, by a committee of masters, but which owed its continued existence chiefly to Dr. W. Stainer and David Buxton. It was discontinued shortly after Dr. Stainer's death in 1898. Although it does not compare with the *American Annals of the Deaf*, the five modest volumes in which it is comprised contain much of interest to English teachers.

A not inconsiderable number of minor educational works of a more special character were also brought out, but they are too numerous to be mentioned, and it would be invidious to make a selection.

The education of the deaf in Britain has at present no special organ, but its interests are to some extent served by two semi-popular journals, the *British Deaf Monthly* (Bolton) and *The Messenger* (Belfast).

Historical Table of British Schools. The figures in the tables which appear on the next three pages have been kindly furnished by the head-masters or mistresses.

Date of Foundation.	NAME.	FIRST PRINCIPAL.	Number of Pupils and Methods, November, 1900.			NOTES.
			Oral.	Manual	Com-bined.	
1792	Asylum for the Education of the Deaf and Dumb Children of the Poor, Old Kent Rd., London ..	Joseph Watson ..	53	—	—	Preparatory School.
1862	Do. do. Margate ...	J. H. Watson... ...	212	42	—	
1810	Edinburgh Institution for the Education of the Deaf and Dumb, Henderson Row	John Braidwood ..	—	47	25	
1814	Royal Institution for the Instruction of Deaf and Dumb Children, Birmingham	Thomas Braidwood...	120	33	13	Some of those classed as oral are so tentatively only.
1819	National Institution for the Deaf and Dumb, Claremont, Dublin	Joseph Humphreys ...	36	—	—	
1819	Glasgow Institution for the Deaf and Dumb...	John Anderson ..	—	—	157	Includes some pupils taught by oral method, but at present not separated from the others.
1819	Aberdeen Institution for the Education of the Deaf and Dumb	Robert Taylor ...	—	—	41	
1825	Liverpool School for the Deaf and Dumb ..	William Comer ..	99	41	—	
1825	Royal Schools for the Deaf and Dumb, Old Trafford, Manchester	William Vaughan ...	161	34	—	
1827	West of England Institution for the Deaf, Exeter	H. B. Bingham ...	90	—	—	
1829	Yorkshire Institution for the Deaf, Doncaster...	Charles Baker ...	103	16	—	* See note at foot.
1831	Ulster Institution for the Deaf and Dumb, Belfast	George Gordon ...	—	45	25	Number below average, owing to temporary causes.
1838	Northern Counties Institution for the Deaf and Dumb, Newcastle-on-Tyne	Andrew Patterson ..	70	92	—	
1841	Bristol District Institution for the Deaf and Dumb, Tyndall's Park...	Matthew R. Burns ..	39	16	—	In the transition state.
1842	Brighton Deaf and Dumb Institution	William Sleight ..	—	38	40	The "combined" method, as understood here, is practically the "oral."
1843	Bath (lately discontinued as a School).	— —	—	—	—	
1846	Dundee Institution for the Deaf and Dumb ...	Alexander Drysdale	—	19	—	
1846	St. Joseph's Institution for Male Deaf and Dumb, Cabra, Dublin (Catholic)	The Christian Brothers	—	196	—	

* There are 16 returned as "semi-imbeciles," educated by "any" method; they are placed in the manual class. First Institution

1841	[illegible] Dumb, Newcastle-on-Tyne	George Gordon				See note [illegible]
1842	Bristol District Institution for the Deaf and Dumb, Tyndall's Park	Andrew Patterson ..	—	45	25	Number below average, owing to temporary causes.
1843	Brighton Deaf and Dumb Institution [illegible]	Matthew R. Burns	70	92	—	
[illegible]	[illegible]	William Sleigh[illegible]	30	16 38	...	In the transition state [illegible] method.
1847	Royal Cambrian Institution for the Deaf and Dumb, Swansea	Charles Rbind ...	—	5	54	Removed from Aberystwith to Swansea in 1850.
1849	St. Mary's Institution for Female Deaf and Dumb, Cabra, Dublin (Catholic)	The Dominican Nuns	—	200	—	Presumed number and method.
1850	Donaldson's Hospital, Edinburgh	— —	12	16	88	
1851	British Asylum for Deaf and Dumb Females, Clapton, London	— —	—	—	40	Pupils of 10 years of age and upwards only.
1862	Llandaff Deaf and Dumb School, Cardiff ..	Alexander Melville ...	—	—	20	Presumed number; method more manual than oral. Formerly at Llandaff.
1866	Jews' Deaf and Dumb Home, Wandsworth Common, London	William Van Praagh	43	—	—	First public oral school. Removed from Notting Hill in 1899.
1870	St. John of Beverley Institution for the Deaf and Dumb, Boston Spa (Catholic) ...	Miss Edwards Sister Mary Lambert	166	—	30	Removed from Handsworth Woodhouse, Sheffield, to Boston Spa, 1875.
1870	Hull, East Yorkshire & Lincolnshire Institution for the Deaf and Dumb, Hull	William Carter (1867) C. Sleight	—	—	—	The education of the deaf, begun by Carter in 1867, was reorganized in 1870 under present title, but the Institution is now an evening continuation school only.
1872	Smyllum Orphanage Institution, Lanark (Catholic)...	— —	—	60	—	
1874	Royal Institution for the Deaf and Dumb, Derby	W. R. Roe	156	—	—	
1894	Royal Cross School for the Deaf, Preston ...	John George Shaw ...	48	23	—	
	"Education Act" Residential Schools.					
1897	Deaf School, Stoke-on-Trent	A. J. Story	60	8	—	Accommodation for 112.
1899	School for the Deaf, Blenheim Walk, Leeds ...	Edward A. Kirk ...	71	22	—	Began as half-day class in 1881 and full day class in 1883.
?	Homerton College Residential School for the Deaf, London	Frank G. Barnes ...	30	—	—	
?	Kingsdown Institution for Deaf Children, Bristol	O. H. Illingworth ...	36	—	—	
	Training Colleges with Practising Schools.					
1872	Association for the Oral Instruction of the Deaf and Dumb, Fitzroy Square, London	William Van Praagh	50	—	—	The oral method is defined as "pure." There are 9 normal students.
1878	Society for Training Teachers of the Deaf and Dumb on the "German" System, Ealing, London	Arthur Kinsey ...	22	—	—	

SCHOOL BOARD DAY SCHOOLS OR DAY CLASSES, 1900.

Special provision is made for the day education of the deaf by the School Boards of the cities and towns named below. The oral method is followed more or less. The number of pupils in Nov. 1900, is appended in each case, and except where otherwise stated, refers to those so taught.

London, 600—At the "Hugh Myddleton," Clerkenwell, and 18 other Centres. Of this number 12 per cent., about 70 to 80, are accounted "mentally defective," and special provision is made for these in four Cottage Homes at Anerley, the combined method being employed with them.

Ayr	8
Barking	10
Birmingham	28
Bradford	28
Burnley	30
Cardiff	22
Croydon	9
Dundee	22
Govan	22
Graig (South Wales) (manual)	9
Greenock (3 combined, 25 oral)	28
Hull	33
Leicester	31
Llanelly (4 manual, 10 oral)	14
Nottingham	40
Oldham	31
Paisley	12
Plymouth	21
Tottenham	25
West Ham (2 centres)	44
Yarmouth	7
Total	1074

The preceding tables have been compiled to show the growth of the education of the deaf in the United Kingdom in the foundation of institutions and schools in order, with the number of pupils and the methods employed at the end of the century. The terms under which the methods are classified must be understood in a general sense, and as expressing a principle rather than the precise form followed, which may vary in details in different schools. In practice it is not always easy to discriminate between an "oral" and a "combined" method, and this is especially the case when, with speech as the chief means of instruction, signs and manual spelling are to a limited extent countenanced.

For purposes of comparison, a summary of the figures relating to all but three—Derby, Hull, Bath—of the schools in Mr. Shaw's Report to the Committee of the Royal Cross School, Preston, 1892, and those of the *same* schools in our list is subjoined.

	27 Institutions and Schools in 1891.		The same in 1900.
Oral - - - -	907	...	1,276
Manual - - -	908	...	900
Combined - -	675	...	533
Total	2,490		2,709

Expert opinion shows that education in a residential institution or school is more satisfactory in results than in a day school. Without in any way disparaging the latter, we think it better therefore to schedule the two classes separately, but, as will be seen, the total number in the Kingdom under instruction in November, 1900, was 4,237.

SECTION IV.—THE UNITED STATES.

Thomas Hopkins Gallaudet, L.L.D. (1787–1851). Of French Huguenot descent, Dr. Gallaudet was a native of Philadelphia, but afterwards went with his parents to live at Hartford, Conn., and in 1805 graduated at Yale, in which University he was a tutor for a short time. In 1812, having decided to join the Christian ministry, Gallaudet entered the Theological Seminary at Andover, Mass. Amongst the friends and neighbours of his father at Hartford was Dr. Mason F. Cogswell, whose little daughter Alice was deaf and dumb. During the winter of 1814–1815 Gallaudet, who was then at home from college, and, owing to the state of his health, undecided as to his future course, met little Alice, and so deeply did he become interested in her, that he devoted some of his time to instructing her.

As a result of this, Dr. Cogswell was led to consider the practicability of establishing a school for the deaf in the town, and a committee was formed to raise funds to defray the expense of sending a suitable person to Europe to acquire the art of teaching the deaf. Gallaudet was prevailed on to go there for that purpose, and sailed in April, 1815. Arriving in England, he made efforts to obtain the knowledge he required, first from Dr. Watson and afterwards Mr. Kinniburgh, of Edinburgh, but failed owing to their narrow monopolizing spirit, although the latter was not entirely to blame in the matter. Gallaudet therefore proceeded to Paris to the Abbé Sicard, who afforded him every facility for acquiring the art, so that he felt justified in returning to Hartford in August, 1816, taking with him Sicard's celebrated pupil, Laurent Clerc, who had offered his services as a teacher in the New World. After the necessary funds had been raised, a school was opened at Hartford in April, 1817, with twenty pupils. Such was the origin of the Connecticut Asylum—the first school for the deaf in America. The name was shortly after altered to that of "The American Asylum, &c., for the Deaf and Dumb," but in accordance with the altered sentiment of the time in regard to the educational status of the deaf as a class, this was again in 1895 changed to "The American School at Hartford for the Deaf." Of this school Dr. Gallaudet was the head for fourteen years. Influenced as he was by Sicard, Dr. Gallaudet's sympathies were all in favour of the French system, to which he remained faithful, nor did he attempt any innovations of his own.

Harvey Prindle Peet, L.L.D. (1794—1873). The New York City Institution was the next to be established in 1818, chiefly through the efforts of the Rev. John Stanford. Its history is closely associated with that of the two Peets, father and son. The elder, who had been an assistant of Dr. Gallaudet at Hartford, was appointed principal in 1831, and carried out his duties with much zeal and efficiency until his resignation in 1867, when he was succeeded by his son, Dr. Isaac Lewis Peet. Dr. H. P. Peet was in his time regarded as one of the leading instructors of the deaf in America. He was a firm and consistent adherent of the French system, as modified in America, which he applied with much ability. "Maintaining all the time the superiority of the natural language of signs as a medium for the communication of ideas imparted, without regard to the words in which they might be expressed, he not only admitted but advocated the employment, to impress upon the mind the idea and form of phrases and sentences, of methodical signs; that is, of a system of signs exactly representing words, in which every inflection and particle was emphasized, and which were made *in the order of the words* . . . . He held, however, that at an early day they should be discarded, and the pupil led to rely upon words directly, to think in them, and in their order." Whether such a change from an original association between ideas and signs to one between ideas and words was possible was a point long discussed; Dr. Peet holding that it was, while others held that the first association was permanent and that the sign always intervened as the medium between the idea and the word. Although *methodical* signs were thus discarded as soon as possible, in practice their place was taken by a purely colloquial language of signs following its own natural syntactical order—a language that in America reached a degree of development unknown in the Old World. The use and comprehension of written language was regarded as of great importance, and to this end grammatical analysis was assiduously cultivated, but, as might be expected, not with results commensurate to the labour expended. In regard to speech Dr. Peet did not think that it could be taught with any advantage to more than a very small number, and in general he held that it could not be made so good an instrument of mental and moral development, or even of teaching written language, as signs.

This method, now more commonly known as the manual method, was, with unimportant exceptions, pursued in America for half a century after the first school was started. Dr. Peet published a *Course of Instruction* which was well known and extensively used.

Gallaudet College The Columbia Institution for the Deaf at Washington was founded in 1857 with Edward Miner Gallaudet, the youngest son of Dr. Gallaudet, as superintendent. In 1862 a proposal was made that the scope of the school should be enlarged by the establishment of a collegiate department for the higher courses of study. This idea of a special college for the deaf had for a long time been urged by many prominent teachers. It was at length carried into effect by the establishment in 1864 of the "National Deaf-Mute College" in connection with the Columbia Institution, with Dr. E. M. Gallaudet as president—a position he still holds with distinction—and with power to confer collegiate degrees. In 1891 it was strengthened by the formation of a normal department, with six fellowships, for hearing students desiring a special training in the manual and oral systems, with a view to becoming teachers. In 1894 the name was altered to "Gallaudet College," in honor of Dr. T. H. Gallaudet. It is unique in being the only college for the deaf in existence, and as such it is an interesting development of the education of this class. Whether a similar scheme would be practicable in the Old World is at least doubtful, not from any insurmountable difficulty in the higher education of the deaf, but that the social conditions are not the same, and that the results of such a special collegiate education would not be regarded as of much value unless they were submitted to the test of an independent authority.

Clarke Institution for the Deaf, Northampton, Mass. In 1843 the Hon. Horace Mann and Dr. Samuel G. Howe, the instructor of the celebrated blind deaf-mutes, Laura Bridgman and Oliver Caswell, made a tour of Europe, in the course of which they visited some of the German schools for the deaf. On his return home, Mr. Mann made a report in which he urged the superiority of the German system over that pursued in America. It excited great interest, but no immediate results ensued. However, in 1864, Dr. Howe, seconded by Mr. G. G. Hubbard, one of whose children was deaf, made an effort to secure the incorporation of an oral school for the deaf in Massachusetts, but obtained no success owing to the opposition of the American Asylum at Hartford. At this juncture, in 1867, Mr. John Clarke of Northampton, Mass., proposed to contribute towards the endowment of a school, an offer that was accepted by the State, and the same year the institution bearing his name was founded for the purpose—although not officially pledged to it—of teaching the deaf by articulation and lip-reading only. Such was the origin of the first exclusively oral school in the United States. It was placed under the charge of Miss Harriet B. Rogers, who as early as 1864 had undertaken to teach a deaf-mute to speak, and two years later opened a private school at Chelmsford, Mass. The success of the Clarke Institution was from the first very marked, and it always commanded the respect of American instructors of all schools of thought. The method followed differed from the German in that articulation was not directly associated with language for the first three years, a detail that is doubtless now abandoned.

It is fair to add that the Clarke Institution in its special object was anticipated a few months by a Jewish oral school established in New York by Bernhard Engelsmann, and recognised by the State a few years later. It is now the New York Institution for the Improved Instruction of Deaf-Mutes, and is unsectarian.

Methods since 1867. As early as 1844 Prof. G. E. Day, of the New York Institution, and Lewis Weld, Principal of the American Asylum at Hartford, made an official tour in Europe for the purpose of reporting on the merits of the various methods pursued there. Dr. H. P. Peet made a similar tour in 1851–52, and ten years later Prof. Day made a second official tour. Their united testimony amounted to this, that while the American system as a whole was, in their opinion, superior to the European methods, they strongly recommended the justice and expediency of giving instruction in speech to the very limited number, as they considered, of the deaf who were capable of it. But nothing whatever came of their recommendations until 1867, when—to quote Dr. E. M. Gallaudet, slightly abridged—"the directors of the Columbia Institution, having their attention called to the movement on foot in Massachusetts in behalf of the oral method, ... decided to send their president, Dr. Gallaudet, to Europe, for the purpose of making a thorough examination of all the methods pursued there. Dr. Gallaudet spent six months abroad, and visited about forty institutions. In his report to his board, in Oct., 1867, Dr. Gallaudet took very different ground with reference to the oral method from that maintained by Prof. Day and Mr. Weld. Giving the preference, as his father did, to the manual method, if the whole body of the deaf are to be restricted to one kind of instruction, he admitted the practicability of teaching a large proportion of the deaf to speak and to read from the lips, and advocated the introduction of articulation as a branch of instruction in all the schools of this country. Influenced by Dr. Gallaudet's recommendations, the directors of the Columbia Institution authorized the calling together of a conference of the principals of all the Amerian schools for the deaf, to be held at Washington in 1868. The principals of fifteen institutions out of the twenty-five then existing, together with three other gentlemen, met in May of that year. Articulation occupied a prominent place in discussions extending over five days, and in the end the following resolution was unanimously adopted:—'That in the opinion of this Conference it is the duty of all institutions for the education of the deaf and dumb to provide adequate means for imparting instruction in articulation and lip-reading to such of their pupils as may be able to engage with profit in exercises of this nature.'"

This action gave a great impulse to oral teaching in America, and classes were rapidly formed in most of the schools. Such was the origin of the *Combined System*—a term which Dr. Gallaudet was the first to use in his report of 1867, and which he defined as that in which "the sign language is admitted as a valuable adjunct in all stages of deaf-mute instruction, if it is not acknowledged as the basis of education," or more exactly, as that in which either (a.) the sign language and manual alphabet are the basis, and articulation and lip-reading a mere branch of instruction, or (b.) articulation is the basis of instruction, signs, etc., being freely used to do the work which articulation fails to accomplish. But the first of these two was undoubtedly the original form in which the combined system was and is still largely practised, with the result that speech was little more than an incidental "accomplishment." It was in fact an ancillary rather than essential part of the school course. Subsequently, however, various combinations of the four principal means of instruction, speech, signs, writing, and the manual alphabet were proposed and carried out, all of which are difficult to classify, as the system is not a single process of instruction founded on some definite principle, but rather a complex in which these means of instruction are all employed more or less according to the predilection of the teachers and the idiosyncrasies of their pupils. In recent years there has, however, been an increasing tendency to give speech a larger place in the school course and to eliminate the conventional sign language to a correspondingly greater extent. In this connection we may quote the following important resolution passed at the seventh Conference of Principals held in Colorado in 1892, "that in all schools for the deaf, pupils who are able to ariculate fluently and intelligently should recite orally in their classes, and be encouraged to use their vocal organs on every possible occasion." An interesting form of the combined system is that carried out with great success by Dr. Westervelt at the Western New York Institution, Rochester, N.Y., in which the only means employed for all are speech, writing and the manual alphabet—the conventional language of signs being wholly excluded both in and out of school. Practically this is a verbal language method. In some cases the "combined system," as a term, signifies that two or more distinct methods—*e.g*. the "oral *method*" and the "combined *method*" are carried on separately in the same institution.

Although the combined system, in its narrower sense, became and is the dominant one in the States, the oral system has also made considerable progress, a fact largely due to the efforts of Dr. Alexander Graham Bell, of telephone fame, and himself married to a deaf lady. Dr. Bell had, in 1869, in England made an attempt to apply to the oral education of the deaf the system of "Visible Speech," invented by his father, A. Melville Bell, in which the sounds of all languages were represented by means of one alphabet, so devised that the characters should reveal the organic formation of the sounds. Afterwards going to America, Dr. Bell brought the system to the notice of teachers of the deaf there, and it was tried first at the Boston School for the Deaf and then in a few others, and he himself opened a normal school at Boston in 1872 to give practical instruction in the system, which, however, had only a short vogue. In 1883 he started a private oral school at Washington, with a normal department in 1886, which he discontinued after a few years; and he also founded the "Volta Bureau for the increase and diffusion of knowledge relating to the Deaf." Chiefly through his efforts, there was also founded in 1890 "The American Association to promote the teaching of speech to the Deaf," which has recently started an excellent organ of its own—

The Association Review. Dr. Bell has waged a relentless war against the sign language, but singularly enough he does not object to the use of the manual alphabet, which he regards as simply a species of writing, provided it is not used in the place of speech. Dr. Bell also, in his views on the oral method, does not favour the usual process of teaching the separate speech-sounds before proceeding to words and sentences —the "element method"—but would begin with whole words and sentences, which the children learn to recognize by writing or lip-reading, or *vice-versa*, before being taught to pronounce them—the "word and sentence method."

Statistics. In November, 1900, according to the *American Annals*, there were 57 public schools, with 9,504 pupils, of whom 4,703 were taught speech, and of these 3,765 were taught "wholly or chiefly by the oral method." There were also 44 public day schools, with 708 pupils, of whom 680 were taught speech, inclusive of 602 who were taught by the oral method. But when not entirely oral or manual the schools are usually classed as employing the combined system, whether or not including the oral method proper. If the number of pupils in the "denominational and private schools" be included, we have the result that out of a total of 10,608 pupils 5,687 were taught speech, inclusive of 4,538 taught wholly or chiefly by the oral method. But according to Dr. Bell, the number taught speech and lip-reading in that year was 6,884, or 64 per cent., inclusive of 2,757 *wholly* taught by the oral method, and 1,643 with the addition of the manual alphabet, *i.e.*, a purely verbal method. A most interesting proof of the progress of the oral method is furnished by the Pennsylvania Institution, where, in 1881, out of 355 pupils, 319 were taught by the manual method and 36 by the oral, but in 1900 out of 500, while only 30 were taught by the manual alphabet method, 470 were taught by the oral, giving a percentage of 94. Since 1891 the progress of the oral method in the United States is said to have been relatively more rapid than that of any other.

The methods now used in the United States are classified and defined by Prof. E. A. Fay as follows :—

I. *The Manual Method.* Signs, the manual alphabet, and writing are the chief means used in the instruction of the pupils, and the principal objects aimed at are mental development and facility in the comprehension and use of written language. The degree of relative importance given to these three means varies in different schools ; but it is a difference only in degree, and the end aimed at is the same in all.

II. *The Manual Alphabet Method.* The manual alphabet and writing are the chief means used in the instruction of the pupils, and the principal objects aimed at are mental development and facility in the comprehension and use of written language. Speech and speech-reading are taught to all the pupils in one of the schools recorded as following this method.

III. *The Oral Method.* Speech and speech-reading, together with writing, are made the chief means of instruction, and facility in speech and speech-reading, as well as mental development and written language is aimed at. There is a difference in different schools in the extent to which the use of natural signs is allowed in the early part of the course, and also in the prominence given to writing as an auxiliary to speech and speech-reading in the course of instruction ; but they are differences only in degree, and the end aimed at is the same in all.

IV. *The Auricular Method.* The hearing of semi-deaf pupils is utilized and developed to the greatest possible extent, and, with or without the aid of artificial appliances, their education is carried on chiefly through the use of speech and hearing, together with writing. The aim of the method is to graduate its pupils as hard-of-hearing speaking people instead of deaf-mutes.

V. *The Combined System.* Speech and speech-reading are regarded as very important, but mental development and the acquisition of language are regarded as still more important. It is believed that in many cases mental development and the acquisition of language can be best promoted by the Manual or the Manual Alphabet method, and, so far as circumstances permit, such method is chosen for each pupil as seems best adapted for his individual case. Speech and speech-reading are taught where the measure of success seems likely to justify the labour expended, and in most of the schools some of the pupils are taught wholly or chiefly by the Oral method or by the Auricular method.

American Annals of the Deaf. It will be sufficiently evident from the foregoing sketch that the methods employed have been for the most part imported from Europe, in whose literature, indeed, American instructors have always kept themselves well posted up. This may account for the almost entire absence of special works produced in the United States, comparable, at any rate, with those issued in Europe; nor is there even any work descriptive of that peculiarly American product, the combined system, although even this cannot be said to be original. An exception must, however, be made in the case of the *American Annals of the Deaf,* a periodical publication of which forty-five volumes were issued in the course of the last century. In the variety of its contents, which deal with every subject of interest to teachers of the deaf; in the value of some of its more important papers; as a historical and bibliographical record; and in the generally high standard maintained, the *Annals* may be described as almost encyclopædic, and certainly unique in our special literature.

The *Annals* was begun at Hartford, in 1847, by the instructors of the American Asylum, one of whom was Luzerne Rae. Suspended in 1849, it was resumed the following year under the direction of a committee appointed by the first Convention of American Instructors, with Mr. Rae as editor. On his death, in 1854, he was succeeded by Prof. Samuel Porter, who held his office until 1861, when the *Annals* was again suspended on account of the Civil War, and resumed in 1868 under the editorship first of Lewellyn Pratt until 1870, and then that of Prof. E. A. Fay, of Gallaudet College, under whose able charge it has remained since.

SECTION V.—ITALY.

The first school in Italy was that founded by the Abbé Silvestri, in 1784, at Rome. He received his training under de l'Epée at Paris, and from what is known of him he appears to have attached much importance to the acquisition of speech, in the teaching of which he followed Amman, and to writing as a means of instruction; but in general he was greatly influenced by de l'Epée. He was well acquainted with

Hervas y Panduro, whose work we have already mentioned. The next school to be established was that at Genoa in 1802, with Ottavio Assarotti for its principal, who followed the French system of Sicard. Another eminent pioneer was Antonio Provolo, founder of the Verona Institution, who not only anticipated in some respects the oral method, but even made some attempt to teach his scholars singing. But one of the oldest and best known teachers in Italy was **Tommaso Pendola (1800—1883)**, of the Siena, now the Pendola, Institution, which he founded about 1828 and directed for over fifty years. Pendola, in common with most of the Italian teachers of the first three quarters of the last century, followed the French system in a modified form, but he became one of the earliest and most enthusiastic leaders in the reform which eventually led to the general adoption of the pure oral method in Italy. Associated with him in this work was the brilliant Enrico Marchio, whose connection with it did not cover more than nine years previous to his death in 1882. To these devoted men, must be added the Abbé Balestra, of the Como, and afterwards the Buenos Ayres Institution, one of the earliest and most enthusiastic advocates of the pure oral method.

Guilio Tarra (1832—1889). The rise and progress of the *pure* oral method is more closely associated with the Abbé Tarra than any other as its chief advocate and expositor. A native of Milan, he entered the Church with a view to mission work, but on the foundation, in 1854, of the Institution for the Indigent Deaf at Milan by Count Paul Taverna, he was persuaded to become its director and professor. He devoted himself to his new work with great ability and enthusiasm, and succeeded so well as to make for himself a reputation almost as world-wide as that of de l'Epée.

At first Tarra taught by the usual method in which natural signs, writing and the manual alphabet were the chief means employed, but he soon abandoned signs as a means of teaching language in favour of the intuitive or perceptive method of direct association with objects and actions by means of writing and manual spelling only. Speech and lip-reading were taught as far as practicable, and gradually as more attention was given to them they took the place of writing and manual spelling, not only as means of intercourse, but also of instruction, writing, however, still remaining the basis of the method. Then, little by little, Tarra came to the conclusion that the dependence of speech on writing and manual spelling had a prejudicial effect, in preventing it from being the real and living language of the deaf which he conceived it might become if it was made the exclusive basis of their education. To use his own words, "after recognizing that a mixture of means was prejudicial to our work and hindered our progress, we, from 1870, resolved to teach speech by speech alone. In a word, we proposed to give our pupils, above all, articulation and lip-reading, and to teach them by speech the value of words in presence of the object or fact, so as to be able to instruct them by that means in the knowledge necessary to complete their education. Henceforward, we proscribed from our schools signs of every kind, reproductive or natural, destined to recall objects, actions, and their relations in the teaching of language; to the end that this teaching might have no other element to give form to the idea but the fact perceived and directly expressed by speech. At the same time, manual spelling, which distracted attention from lip-reading and rendered it useless, was suppressed and soon completely abandoned by the pupils themselves. . . . . . For the same reason and to the same end written language, in so far as it expresses the idea, was, as is the case with us who hear, subordinated to spoken language; it has quite a secondary place as a useful application; it no longer serves to teach language, but simply to fix and recall it, when it has been learned from the lips of the teacher, pronounced and repeated by the pupil in presence of the real objects it represents. Speech remains, then, the first object and the only means of instruction and intercourse, either to teach the pupils language or to give them notions. Speech and lip-reading are taught above all else, but sometimes during the preparatory period the deaf child, restricted by his natural ignorance, is allowed, in order to indicate his few physical and moral needs, to use such signs as he spontaneously makes for that purpose, care being taken to allow him no chance of augmenting and making a language of them. As soon as his articulation is assured, he is always given, by speech alone, the knowledge of words and phrases, and gradually all that is necessary to his intellectual and moral instruction."

"It is on these grounds that the method we follow is called the *pure oral perceptive; oral*, because the teaching is given by speech alone, articulated and read on the lips; *perceptive*, because speech is taught in presence of the fact immediately perceived, or recalled to the sense and intelligence by means of known words; *pure*, because it is unmixed, and is neither preceded nor followed by means capable of attenuating or confusing the impression and efficacy of living speech."

In the teaching of language, which should be begun as soon as the pupil can pronounce combinations of sounds, Tarra says: "Without losing sight of the way traced by grammar (by which must be understood that which follows a logical order), but, on the contrary, studying it ourselves as closely as possible, without inflicting it on the feeble understanding of our pupils, we conform, in the first teaching of language, to the *practical*, *experimental* and *maternal* method."

The pure oral method, as formulated by Tarra, is in most respects only the German system carried to a greater extreme; it is, however, to be observed that Tarra did not call it so in relation to that system, but because he had gradually eliminated from his teaching all those features which hindered the cultivation and progress of spoken language. Its success in the land of its birth was great and immediate, and it became, as it has remained since, the only one employed in Italy.

The International Congress at Milan, 1880.

Four international congresses of teachers of the deaf were held in the last century—the first at Paris in 1878, the second at Milan in 1880, the third at Brussels in 1883, and the fourth at Paris in 1900. But the second, in the importance of the resolutions carried and the great influence it had in hastening the progress of oral teaching, especially in France, is historically the most interesting. It was, moreover, the crowning event in the Abbé Tarra's career, as he on that occasion acted as president, and saw his most cherished ideas practically approved and accepted. Eight resolutions were agreed to, of which we quote the first, second, and fourth, which were passed by all but a small minority of the one hundred and sixty-five, or so, members present :—

1. The Congress, considering the incontestable superiority of articulation over signs in restoring the deaf-mute to society and giving him a fuller knowledge of language, declares that the oral method should be preferred to that of signs in the education and instruction of the deaf.

2. The Congress, considering that the simultaneous use of articulation and signs has the disadvantage of injuring articulation and lip-reading and the precision of ideas, declares that the pure oral method should be preferred.

4. The Congress, considering that the instruction of deaf-speaking children by the pure oral method should follow as closely as possible the methods of instruction of hearing and speaking children, declares: (1) That the most natural and efficacious means by which the deaf-speaking child can acquire a knowledge of language is the intuitive method, which consists in indicating, first by articulation and then by writing, the objects and facts placed before the pupil ; (2) That in the first period, called *maternal*, the deaf-mute should be brought to the observation of grammatical forms by means of examples and practical exercises, and that in the second period he should be aided to deduce from these examples the principles of grammar, which should be expressed as simply and clearly as possible; (3) That manuscript books, with the words and forms of language known by the pupil, may be placed in his hands at all times.

The principal organ of the education of the deaf in Italy is *L'Educazione dei Sordomuti* (Siena).

Summary. It is hardly possible to summarise the somewhat bewildering and apparently conflicting mass of historical details in regard to modern progress in the education of the deaf, of which only a mere sketch has been attempted, but certain features may be broadly described.

1. In the previous period we have seen that the necessity of a restoration of speech to the deaf, aided, it is true by other means, was, with very few exceptions, held as a necessary condition of their education. But this theory was completely upset when the Abbé de l'Epée introduced his method of teaching by the sign language only, in opposition to which we have that of teaching by speech only, as advocated by Heinicke and his compeers, so that henceforward the battle was between these two methods—the French and the German.

2. At an early stage in the history of the French system, methodical signs gave way to a language of signs following its own order and syntax, and in this modified form the system prevailed and was followed in France, Italy, Great Britain and America, while in Germany its influence was so great that a compromise was attempted and a mixed method followed.

3. Then a reform followed, which by assimilating methods to those followed in the education of the hearing, aimed at enabling the deaf to directly learn and use the vernacular of their country. It was led by Valade-Gabel in France, Hill in Germany, Tarra in Italy and Arnold in England, and was carried out in two directions, firstly, (*a*) in the case of the French system by a larger use of written language in direct association with ideas, (*b*) in the German by a more exclusive use of speech as the end and means of instruction with the disuse of all but natural signs, which in the case of the Italian, or pure oral, method was carried out to the furthest; and secondly, by the gradual substitution in both of these systems of the natural, intuitive, or logical teaching of language for the formal or grammatical process.

4. But in America the movement took a different course. There the sign language had been developed to a greater degree of perfection, and was more highly thought of than in Europe, and speech was admitted only as a special branch of instruction, having little or no influence in the development of language. This gave rise to the combined system, but, later, a larger place was assigned to speech both as a means and an end of instruction.

5. The tendency everywhere has been steadily and increasingly to discredit the conventional language of signs as interfering with the natural acquisition by the deaf of spoken and written language, and this even where speech is not taught, so that purely verbal forms of language are now more relied on.

6. It may now be safely said that the art of educating the deaf, originally almost entirely empirical, has been placed on a sound and scientific basis, especially in regard to the difficult subject of teaching language, and this independently of any question as to the practical value of speech and lip-reading as a means of ordinary social intercourse.

7. With the gradual introduction of the German system into Great Britain, the United States, and most remarkable of all, its practically unanimous adoption in France in the form in which it was originally developed in Italy as the pure oral method, the necessity for national distinctions has passed away and we have as the net result these changes:—The original French is now the Silent or Manual System, the German and Italian together the Oral System, while the employment of the leading features of both throughout the course constitutes the Combined System with its varied methods. In regard to the "Pure Oral Method," the term had its birth in historical circumstances that have passed away, and it is now a mere pleonasm. In this work, the term "Oral System" will be used without any further qualification.

[REFERENCES. In addition to the books mentioned in the text, a few of which are repeated here for convenience, the following may be studied for the history of the subject: —Bonet, *Simplification of the Letters of the Alphabet, and Method of Teaching Deaf-mutes to speak*, translated by Dixon, with *Historical Introduction* (with full bibliographical references) by Farrar, 1890: Degerando, *De l'Education des Sourds-Muets de Naissance*, 2 vols., Paris, 1827: Walther, *Geschichte des Taubstummen-Bildungswesens*, Leipsic, 1882: Guyot, *Liste Littéraire Philocophe*, Groningen, 1842: Alings, *Catalogus Bibliothecæ Guyotianæ*, Groningen, 1883: Berthier, *L'Abbé de l'Epée*, Paris, 1852; and *L'Abbé Sicard*, Paris, 1873: Ernest La Rochelle, *Jacob Rodrigues Pereire*, Paris, 1877: Gallaudet, *Life of Thomas Hopkins Gallaudet*, New York, 1888: Arnold, *Reminiscences of Forty Years* (privately printed): Tarra, *Esquisse Historique et Court Exposé de la Methode suivé pour l'instruction des Sourds-Muets*, translated by Dubranle and Dupont, Paris, 1883: Arnold, *Education of Deaf-mutes, Teachers' Manual*, Vol. II., 1891 (from the scholar's standpoint not altogether reliable): *American Annals of the Deaf*, Washington, 1847–1900 (with three indexes): *Quarterly Review of Deaf-mute Education*, London, 1886–98: *Dictionary of National Biography*, London, 1885–1900: *Encyclopædia Brittanica*, 9th Edition (for Cardan): *Biographie Universelle* (Michaud), New Edition, Paris.]

ERRATUM.—Page 51, for "At one time . . . . . . Paris," read, "Successively teacher in the Paris Institution, head of that at Bordeaux, ..."

Book II.

THE EDUCATION OF THE DEAF.

CHAPTER I.—INTRODUCTION.

SECTION I.—DEFINITIONS AND CLASSIFICATION.

Deafness, etc. *Deafness* and *dumbness* have no necessary physiological connection with each other. The latter is simply a secondary and negative condition due to the loss, from pathological alterations of the auditory organs, of the sense of hearing, through which the use of the organs of speech is ordinarily acquired, and must not be confounded with *aphasia*, *i.e.*, the loss of speech as a result of cerebral affections, or with *aphonia*, *i.e.*, the inability to produce vocal sounds as a result of nervous affections. In the great majority of those designated "deaf and dumb" the organs of speech are usually in a normal condition, but this does not always imply that they are capable of being taught to speak, for in a certain proportion of cases, commonly where the deafness is absolute or nearly so, low brain development or want of sufficient nervous energy, or both, may render the attempt either difficult or useless. When the organs of speech are not in a normal state, the defect may be due either to some diseased condition associated with or arising from the original cause of the deafness, or to other causes which have no connection with and do not in the least affect the ear. Such cases of either kind are comparatively rare. Deaf-dumbness, or as it is more usually termed, *deaf-mutism*, is then a condition in which the deafness in most ordinary cases entails as a consequence, not injury to the organs of speech, but simply their disuse, which may be followed by a partial loss of mobility if they are allowed to remain long in that state. It also usually implies that condition of mental and social inferiority which ensues as a result of want of education or of neglect, which, if allowed to continue, may in extreme cases lead to a general atrophy or degeneracy of the organs of thought and possibly to idiocy.

Deafness as a term is an extremely elastic one, as it may be of all degrees, from absolute congenital deafness to the merely hard-of-hearing condition of the aged. What degree is necessary to produce dumbness it is, however, not always easy to say, for deafness is very rarely absolute. But deaf-mutism is the usual result of congenital deafness, and of deafness acquired through disease and other causes in the first years of childhood, before speech has been acquired. But dumbness may also ensue after speech has been acquired, if the degree of deafness is such that the human voice cannot ordinarily be heard For this degree of deafness Dr. J. Kerr Love proposes the special term *surdism.* In general, a child is classed as "deaf and dumb" who is congenitally deaf, or who from any cause afterwards becomes so deaf as to render the acquisition of speech impossible, or cause it to lose recently acquired speech, and in either case incapable of receiving instruction by the ordinary methods applicable to those who hear. Deaf-mutism, as a specific condition, seldom occurs after the seventh year, and when not congenital, more commonly ensues before the fourth or fifth year.

This is not the place to consider the subject from the medical or statistical standpoint. Deaf-mutism is usually a finished condition and has to be accepted as such, for medical science confesses that there is no radical cure for it, or rather for deafness; hence, where it fails, the art of the teacher has to step in and remedy it by its special methods. The causes of deafness may be either direct or indirect. The former are defects in the organs of hearing, whether congenital or adventitious, and belong to the domain of otology; the latter are heredity, disease or accident. Truly congenital deafness is frequently due to heredity, but as Prof. Fay observes, such expressions as "hereditary deafness," etc., are inaccurate and misleading, for what is really transmitted and inherited is not deafness, but some anomaly of the auditory organs or of the nervous system or a constitutional tendency to some disease of which deafness is but a result or symptom. In the same way, consanguineous marriages, while not in themselves necessarily a cause of deafness, tend to intensify any inherited tendency to deafness which may exist in the families of either or both partners and so produce deaf offspring. Recent investigations by Prof. Fay into the marriages of the deaf in America have demonstrated the fact that while marriages of deaf persons are in the aggregate more liable, though not necessarily, to produce deaf offspring than is the case with those who hear, such marriages are the most likely to produce deaf offspring in which either or both of the partners have deaf relatives. In fact it can be shown that heredity operates in an ever increasing degree from the marriages of adventitiously deaf persons unrelated or who have no deaf relatives, and where the liability to deaf offspring is practically *nil*, to those of congenitally deaf persons related to each other, or with deaf relatives, where the liability is a practical certainty. It may be concluded that a similar hereditary tendency is operative, although in a less intense degree, in the case of those who hear, so that—to put the matter in an extreme way—other things being equal, two hearing partners who have deaf relatives are much more likely to have deaf offspring than two deaf partners who have no deaf relatives. Even in adventitious deafness, heredity may augment the effects of disease or accident to which it is ordinarily due.

It must be observed that it is frequently difficult to say whether a case of deaf-mutism is congenital or not, as the onset of deafness may occur during the first few months after birth, and is only discovered from unusual circumstances, such as the absence of any response on the child's part to sound.

Non-congenital, acquired, or, as it is sometimes termed, adventitious deafness is generally an after-effect of disease or accident, the commonest causes being scarlet fever, measles, and cerebral diseases, especially meningitis. From the nature of the case, statistics as to the proportion of congenital and adventitious deafness are of uncertain value, but according to the United States census of 1890, the percentage of the former is 45, and we may broadly say that there are as many of the one as of the other. Calculated from the census returns of the United States (1890) and those of England and Wales (1891), the average proportion of the "deaf and dumb" to the population in both cases, is about one in 1600.

Deaf-mutism, especially when congenital, may bring in its train various forms of physical and mental deterioration, but taking the deaf and dumb as a class, it is found that, other things being equal, they are not physically inferior to those who hear.

It is undoubtedly more difficult to teach them, but it does not follow from this that in mental capacity they are inferior. It would be more correct to say that it is the same *to begin with*, but in the absence of hearing, we are unable to develop it as easily or quickly, or rather our methods are seldom perfect enough to cope with the new conditions created by deafness. The deaf and dumb cannot and should not be classed with idiots, the feeble-minded, lunatics and other exceptional classes, but they may be with the blind.

Classification. It will be understood from what has been said that the deaf and dumb may be classified as congenital or adventitious, but the latter term has been further extended so as to include *semi-mutes*, who possess some knowledge of spoken language acquired before the hearing was lost; and the *semi-deaf*, who have sufficient hearing to be of use to them with or without artificial aid, but not to receive instruction in the ordinary way. It was formerly supposed that adventitious cases were those whom oral instruction would chiefly benefit, but as a matter of fact there is nothing whatever in the mere circumstance of deafness being congenital to debar such cases from oral instruction, and a congenital deaf-mute, whose organs of speech are normal and mental capacity good, may easily be a better subject for this kind of instruction than an adventitious deaf-mute who happens to be deficient in either or both of these respects. Taking one thing with another, there is scarcely any difference between the congenitally deaf and dumb and those of the adventitiously deaf and dumb who have lost their hearing *before* acquiring any speech, and for all practical purposes none is made. But as might be expected, those who have become deaf and, it may be, dumb after having acquired some speech have a certain advantage in possessing a varying proportion of mental endowment due to their speech, although this may be effaced by subsequent unfavourable circumstances or neglect.

For general purposes the classification adopted by the Royal Commission on the Deaf, and here slightly amplified, is quite sufficient—

1. Those who are congenitally deaf and become consequently dumb.

2. Those who have become deaf after birth—acquired or adventitious deafness—who may be subdivided into—
   - (*a*) Those who became deaf before acquiring speech, and usually become dumb—the adventititiously deaf proper.
   - (*b*) Those who became deaf after having acquired some speech and *may* become dumb—semi-mutes.

3. Those who possess some hearing power—the semi-deaf.

Hitherto we have spoken of the deaf *and dumb.* This is the term by which the class has been designated in all English speaking countries, but within the last fifty years the term *deaf-mutes*, following the European model, has been the more usual one in America, and is certainly less objectionable. More recently, however, sentiment has favoured the use, both in England and America, of the simple term *the deaf* to designate the whole class of those who are, or in the case of the orally educated, have been in the condition of *deaf-mutism*. The term is admittedly ambigious, but its technical significance is now well understood by those using it, and it will be adhered to in this work, except where a special qualification is necessary. Unfortunately we have no term to indicate the orally instructed deaf, and must fall back on some such compound as the "oral deaf," "speaking deaf," or "deaf speaker."

SECTION II.—THE CONDITIONS OF THE HEARING AND THE DEAF CONTRASTED.

Although deafness involves dumbness as its direct effect, from the disuse of the organs of speech, the indirect effects of the double condition of deaf-mutism on the mind are of a more far-reaching character in bringing about an abnormal state to which the ordinary modes of mental growth are unable to adjust themselves or partially cease to act. The new conditions induced will be best understood if we show firstly, how spoken language, the chief instrument in mental development, is acquired by the hearing child, and secondly, the consequences to the deaf child of the loss of speech following on his inability to acquire it.

The Acquisition of Speech by the Hearing Child. Most works on psychology, describe in great detail the development of cognition or intellectual life, from sensation, or the cerebral reception of sense-impressions conveyed by the senses; resulting, first as percepts, including the exercise of the primary functional activities of discrimination, assimilation and association, then as representative images, and finally as concepts, or general ideas. In so far as the senses of smell, taste, touch, and sight are concerned, both the hearing and the deaf child are on common ground, and up to a certain point they acquire the same knowledge and experience of the external world. We say up to a certain point, because the absence of the auditory element in "presentations" in some degree detracts from the clearness and completeness of the resulting sensations. But it is chiefly in respect of its value as a means of intellectual growth that the possession or loss of hearing is of such momentous consequence, and that from this point the divergence between the hearing and the deaf child starts.

Let us first see how the hearing child acquires the knowledge of the meaning of verbal sounds and the use of his vocal organs. As his mental images become more distinct and more firmly associated in the growing experience of life, he begins to attach a meaning to words he hears spoken, which may be as early as the second half-year and several months before actually using them. Hence although he cannot as yet utter a word, he knows receptively much of language in expression and speech, so that he becomes familiar with the names of persons and objects about him and can distinguish them by the sounds belonging to them, and which he has stored in his memory. And further, the mother or nurse may help to suggest the image of an absent object such as "papa" or "bow-wow" by simply talking of it, while the child himself will at a later stage mentally rehearse some of his experiences, *e.g.* those of a walk, "Go tata, see gee-gee, bow-wow," etc. Thus the way is prepared for the natural impulse to use his vocal organs, which, it may be noted, there is good reason to suppose is an innate one due to heredity.

Speech is acquired by *experimental imitation*, or more exactly, it is a faculty which results from the exercise of the imitative function of the mind on the vocal organs under the stimulus of hearing. The first step is the association of a definite articulatory movement with its appropriate auditory impression—the verbal sound. But this implies a mental knowledge that things have names and are known by them. These names are formed of sounds uttered and heard, but having no resemblance to the objects. Their value lies solely in their association, for any other vocal sounds would serve the same purpose, the relation being artificial. To the child, however, it suffices that the sounds mean the things, so he at once proceeds to try and imitate these sounds. He says *pa* for father and *ma* for mother, and as they at once respond by look and gesture, he is encouraged in his attempts and confirmed in his application of the sounds to what is signified. In this process four successive stages may be noted; (*a*) the perception by the child of objects, persons, and acts; (*b*) the hearing of sounds uttered by others; (*c*) their constant association with these objects, etc., in his mind; and (*d*) his successful imitation of them for his own use.

The precise manner in which the imitative function works is an interesting point. The child certainly sees the movements of his mother and nurse's lips, and the impulse to imitate them is aided by the auditory effects. But neither hearing the sounds nor seeing them spoken can suggest to him how to place his vocal organs in the right positions so as to produce the required sounds. Hearing alone is not enough, as it exerts no motor nerve influences on the organs, and can only certify the right sound when it is uttered. It is through *touch* that he is guided, after tentative attempts, to secure the desired result. This arises from its properties of extensity and local distinctness, and to these factors the so-called muscular sense may perhaps be added.

Having mastered the simplest sounds, the child soon begins to acquire the use of spoken language under the sympathetic guidance of his mother and intimates. The most familiar persons, objects, and actions are associated with names, phrases, and short sentences, and constantly repeated until they become familiar, and habit renders their use easy. The ordinary events and occupations of the daily home life provide ample material for the acquisition of language. In this process the child is not troubled with grammatical rules, for he is all the while collecting the materials out of which these rules will be framed and illustrated. And by binding word to word and sentence to sentence in close association, he is learning to think and express himself in a natural and logical order, so that when he enters on the regular school education his teacher finds him already provided with a stock of ideas and elementary language to express them in, both similar in substance and form to his own, which at once places them *en rapport* with each other. This is the *mother's method* of teaching language.

Linguistic Periods. Attempts have been made by observers to distinguish several stages of development in the growth of vocal language in childhood. They are, however, not always very clearly defined and may practically be reduced to three, as follows :—

I. The period of primitive sounds, or of instinctive, natural, or interjectory language, common to all times and peoples, and gradually restricted by the progress of the next stage.

II. The imitative period, or that of artificial language, used chiefly with other children or nurses and parents, and corresponding in part to infantile prattle or babble, but not rising to the dignity of a language proper. This period is also described as that of the development of the linguistic memory centres.

III. The period of thought expression, of the association of ideas with words, culminating in the full acquisition of the family and national language, which supersedes the former stage.

The Loss of Hearing and its Effects. In what follows we assume the case to be one of congenital deaf-mutism or of adventitious deaf-mutism occurring very early—not later than the third year. The first and most obvious effect of deafness is that the conditions of acquiring knowledge and the relations of the child to others are changed. The exclusion of all that is conveyed by sound throws the burden on sight and touch, not only of acquiring and utilizing sense-impressions of the external world, but of finding out what others mean by *their* looks and gestures. Objects and their motions alone remain, unnamed by or dissociated from vocal signs. Nor is this all. Not only do the organs of speech become inert from disuse, but the brain suffers from the inaction of those centres more especially associated with hearing and speech, and a reduction in the working efficiency of the organ as a whole ensues. The internal work of ideation is not entirely suspended, but the concepts formed under such circumstances are blurred and indistinct. The condition of the deaf-mute thus becomes one of mental imprisonment in silence, in which the instincts, tendencies, and impulses roused and cherished by our first mental contact with life and nature, through the association of the hearing with the other senses, and which almost without effort teach us so much of language, are all but stifled or lost. The poor child thus becomes familiar with, and even tired of, everything before he learns their names or uses, and may be troubled with thoughts which he has no means of expressing.

But deplorable as such a condition is, the deaf-mute is not without resources. The imitative function, to which speech owes its origin, is diverted into another direction. Instead of hearing the voices of those about him, the deaf child *sees* their looks and actions, noting, for instance, their expressions of approbation and anger, joy and grief, or such movements as carrying food by the hand to the mouth and moving the jaws in eating, moving the feet in walking or running, laying the head on the pillow and closing the eyes when going to bed, etc. Accordingly, when he wants to do or have any of these things done, he resorts to a mimic reproduction of these movements, or instinctively gives visible expression to his feelings of pain or pleasure. These are the primary elements of the natural gesture language of the deaf, and if they are suitably responded to, are capable of being made use of to a large extent. More frequently, however, these attempts on his part to make himself understood are either not apprehended or else treated with contemptuous pity. Vexation and disappointment follow; he may become passionate, then apathetic, and, if left to himself, lapses into a state of stupidity. The resulting condition may be described in the briefest terms as one of arrested development along all the lines in which cerebral activity is wont to grow.

The precise difference between a hearing and a deaf child in respect to language is this, that the former hears it spoken by others and learns it by imitating them, but the latter does not, and as a substitute copies the forms and motions he sees about him and so invents his own language of gestures, in which he also thinks. And, further, the inability of those about him to understand or use it to more than a very limited extent aggravates rather than mitigates his condition of deaf-mutism.

As science teaches that the history of the development of the individual is a recapitulation of that of the race, some have tried to find in the condition of the uneducated deaf illustrations of a reversion to earlier and lower stages of human existence, especially as seen in savage races. But the application of the doctrine here requires great caution, for it must be recollected that primitive man was in possession of all his senses. Although the gesture language of the deaf is undoubtedly on a lower plane than spoken language, it does not follow, nor are there any facts to support the view, that it represents a distinct and separate stage of human expression previous to speech; rather, it had an importance as an element of expression associated with primitive speech which it has lost in the present highly developed conditions of our vocal languages. Illustrations in one or two other directions may, however, be found in the mental state of the uneducated deaf.

Tylor well observes that "such resemblances [those of natural phenomena to the concrete facts of our ordinary experience in old myths] as have just been displayed thrust themselves directly on the mind, without any necessary intervention of words. Deep as language lies in our mental life, the direct comparison of object with object, and action with action, lies yet deeper. The myth-maker's mind shows forth even among the deaf and dumb, who work out just such analogies of nature in their wordless thought. Again and again they have been found to suppose themselves taught to worship and pray to sun, moon and stars as personal creatures" *(Primitive Culture).* Although the last sentence perhaps slightly overstates the case, undoubtedly Tylor is right in his main conclusion. The old myth making faculty of mankind is well seen in the fanciful and material notions of the uneducated deaf as to the causes of natural phenomena, which in their "wordless thought" are commonly mere crude magnified likenesses of actions and events within their ordinary experience. Thus wind may be due to a huge bellows somewhere; lightning is attributed to the effects of an anvil in the sky, or else to firearms; the stars are candles lighted in the sky, or even fire-grates, or cut out with scissors and stuck on the sky; the sky itself may be regarded as a ceiling within reach; the earth is commonly considered as flat; rain and snow are poured out by superhuman beings from great stores in the heavens; the moon may be compared to a dumpling rolled over the tree tops; even the Almighty, when the idea is in any way instilled into their minds, is pictured as an old man seated aloft controlling the world below, much as Jupiter of yore did; and in the same manner personality may be attributed to the sun and moon. Hearing children certainly have similar fancies, but they are light and fleeting, because soon dissipated, while in the deaf they are usually more definite, coarser, and more persistent. Another point of resemblance to a lower stage of mental development may be seen in their mode of counting, which does not extend beyond the fingers, and a trace of the rude old method of quinary numeration may also be noticed in the process of indicating larger numbers by "fiving," a fact which the writer can confirm from his own experience.

The uneducated deaf have usually no conception of an Almighty Being. Although they have a moral sense, their moral ideas are less definite and developed than with the hearing, and in general their conduct is largely determined by the inhibiting effects of their home and social environment rather than by motive arising from any clear sense of right and wrong.

The characteristics of a condition of mental deaf-mutism, *i.e.*, the lack of a verbal language, are well described by Dr. E. M. Gallaudet :—"But it is not alone in matters of reading and writing that the deaf-mute suffers when his mental deaf-mutism is allowed to remain. His lack of precise language leads to the formation of undesirable habits of thought ; he often reasons ineffectively ; draws hasty and mistaken conclusions—seldom perceiving the nicer distinctions that are drawn in the printed page ; and never uniting them with those that occur in spoken language, he does not learn to make such himself ; rarely reasoned with incisively by hearing and speaking people, he becomes, if strong-minded, opinionated, self-satisfied, and dogmatic, and if otherwise, he forms no opinions of his own, but is led by any stronger will that may assert its power over his."

The effects of deaf-mutism must not however be unduly exaggerated. Other things being equal, the intellectual capacity of the deaf is not inferior to that of the hearing ; their defects are not primary, but secondary as the results partly of the loss of hearing, and partly of the use of a gesture language, which dealing only with the concrete and actual renders it either very difficult or impossible for them to generalize or form abstract conceptions.

SECTION III.—THE SENSES AND THEIR FUNCTIONS.

As education really begins with the primary exercise of the senses, on whose continued existence and efficiency mental life and growth depend, a thorough knowledge of their physiology and functions is desirable. The subject, however, is so fully explained in special works, that we shall only briefly recapitulate a few of the main facts and indicate some special aspects of them from the point of view of our subject.

The nervous system consists of a number of organs called nerve centres, nerves and peripheral end-organs, and of the first the largest and most important are the brain and spinal cord—the cerebro-spinal nervous tube. The upper or cerebral end of this is the *encephalon* or brain—all that part contained within the cavity of the skull—divided into several parts, named the *medulla oblongata* (continuous with the spinal cord), *pons*, *cerebellum* (little brain) and *cerebrum* (great brain), which is the part ordinarily understood as "the brain," and is much the largest division of the encephalon, or *sensorium*. From this nerve fibres pass outwards to all parts of the body, and are divided according to their function into two sets, (*a.*) the centrifugal, efferent or motor, conveying influences outwards from a nerve centre, which include the *motor* nerves proper, ending in voluntary and involuntary muscles, exciting contraction in them and so causing movement, and (*b.*) the centripetal, afferent or sensory, conveying influences inwards towards a nerve centre, which include the *sensory* nerves proper, ending in the skin, mucuous membranes, and organs of special sense, and are classed as (1) general, conveying to nerve centres in the brain influences which cause vague sensations, hardly perceptible to consciousness, and not permanent, as from the lungs, heart, stomach, etc.; and (2) special, conveying to nerve centres in the brain influences which cause certain sensations clearly perceptible to consciousness. In these last the stimuli are usually applied to special structures adapted physiologically for the reception of the particular kind of stimulus or impression and called "terminal organs." As specially developed they constitute the senses of taste, smell, touch, hearing and sight. The sensorium does not, however, act as a single homogeneous whole, but is differentiated into several parts, or nerve centres, each responsive to the stimulus proper to each sense, so that the sensation experienced by each centre is always the same for that centre.

On these sensations, or sense-impressions, perceptions depend, and concepts in turn on these. But it is by means of the intellectual or cognitive function that the sensory impressions transmitted to the cerebral centres are co-ordinated by a process of associative synthesis into a complete perception of an object; its colour and form by sight, its spatial relations and substance by touch, its odour by smell, its taste by the gustatory sense, while changes in its relations to other bodies due to motion are rendered evident as sound by the hearing. In addition to their proper functions, the senses, from their special relations to the properties of matter, are indirectly auxiliary to one another, so that the impression obtained through one is corrected or regulated by that derived through another, as in the correct perception of distance by the eye being aided by the experience of touch. The completeness of concepts is therefore largely dependent on the efficient co-operation of the senses in their entirety.

The loss of hearing has considerable effects on the sensorium; firstly, in bringing on a torpid, and possibly in extreme cases an atrophied condition of the nerve centres of hearing and speech from inaction; secondly, this in turn has a deteriorating effect on the cerebral functions as a whole; and thirdly, the other nerve centres suffer from the disorganizing effects of the loss and from the absence of the indirect stimulating effects of the action of the nerve centres of hearing and speech. The consequence is that the brain becomes enfeebled and the co-ordination and balance of the mental system is disturbed, so that the mind acts imperfectly, while those of its functions dependent on hearing either become dormant or are diverted into another direction. Thus the imitative function, which would have acquired speech through the ear, is in the deaf exercised instead through the eye in forming their gesture language. But on the other hand, although no other sense can take the place of the lost hearing in relation to sound, the auxiliary aid of sight and touch is still available, and in fact renders the oral instruction of the deaf possible. For although the eye cannot perceive vocal sounds, it can to some extent see the organic actions that produced them, and although touch cannot feel sounds, it can feel the organic positions necessary to their production in association with the vibratory effects of the voice within the head—sensations which, as we shall see, have a certain intuitive value.

Nor is this all, for physiologists aver that the senses are not altogether independent of one another. "We are familiar," says Bain, "with a large class of instances where a sense stimulus seems also to be a motor stimulus"; and Lotze says, "there are stimuli of various kinds which, along with their own effects, frequently produce adequate stimuli as side results." Donaldson (*The Growth of the Brain*, 1895) also says, "The working value of the mental images appears also as dependent on the number and balance of the secondary sensations which accompany them. The greater the number of these the more certain and precise is our thought. For this reason the development of the intelligence is associated with the perfection of more than one sense organ, whereas reliance on a single avenue of sense, while it may lead to very precise reactions graded in accordance with the intensity of the single sort of stimulus, leaves us without those fringing sensations which form the basis for distinction and comparison. . . . Thus any lack of early experience may leave a spot permanently undeveloped in the central [nervous] system—a condition of much significance, for each locality in the cerebrum is not only a place at which reactions, using the word in a narrow sense, may occur, but by way of it pass fibres having more distant connections, and its lack of development probably reduces the associative value of these also." The condition thus described is a very serviceable one in the training of the senses, for it assures us that, by bringing one into active and efficient use, others are more or less indirectly benefited by its gain.

Taste and **Smell** are of minor importance as knowledge-giving senses, their functions being chiefly confined to meeting the physical needs of the organism in discriminating what is wholesome or unwholesome, pleasant or unpleasant.

Touch. Located in the skin, this sense gives intimation of pressure referred to the surface of the body. Touch is essentially the appreciation of mechanical force, and is most highly developed in the tongue, lips, hands, and the feet. When the pressure on the tactile points has reached a certain intensity so as to call forth muscular action to resist it, the sensation is commingled with that of the so-called muscular sense, and it is to an appreciation of the niceties of this muscular action that the perfection to which habit so frequently brings the sense of touch is to be attributed. The sensation of touch includes as its characteristic elements, *extensity, weight* and *locality*, giving rise in consciousness, and in the brain, to what is termed a *tactile field* comparable to the visual field of sight. It should be added that in order to obtain a complete tactile picture of objects, the local discrimination of touch has to be supplemented by movement.

Although hearing and sight possess a higher degree of refinement, touch is, from the intellectual standpoint, of more importance, for in its absence speech would be hardly possible, as the two other senses alone could not and do not originate the articulatory movements on which it depends. These are determined and fixed in memory by touch through its localising function. Even the impressions of sight have to be adjusted by those of touch before we can have that perception of the relativity of objects to one another and to ourselves upon which sense-experience of the external world depends. This is the correlation of sense-data.

The importance of the sense of touch to the deaf can hardly be over-estimated, for on it the possibility of teaching them to speak almost entirely depends, in fact, in association with sight, it can so far act as a substitute for hearing as to render speech as natural to the deaf as if they heard. It is therefore necessary to understand exactly how this is brought about.

When we think, we commonly recall visual images or symbols, which are accompanied by "internal speech," consisting partly of auditory and partly of motor images, *i.e.*, those corresponding to the movements of articulation. This is "mental language," which is founded on the mental images derived from the perceptions contributed by each sense. Thus hearing contributes sound images ; touch, images of the organic movements of speech ; sight, images of the visible world ; taste and smell, vague fugitive images only ; and all these images united with those of the names by which they are called, constitute at once the material and the medium of memory and thought. Most persons show a greater aptitude for the use of one class of mental images than for another ; they have accordingly been termed "audiles," "motors," and "visuals" ; corresponding respectively to the first three classes of images just mentioned.

As the deaf-mute knows nothing of sound except in the form of mere vibration destitute of its higher qualities, he has no mental images of it. His actual mental images are wholly visual, aided by motor images, and when his gesture language is sufficiently developed take a pictorial form. His thought is consequently lacking in the clearness, precision and quickness due to the use of sound images, and on which the highest intellectual operations depend. But let him be taught to speak, then the imitation of the vocal sounds, through the sense of touch, will excite in his mind mental images of their organic movements and positions commingled with faint images of the associated vocal vibrations, exactly as the same sounds, heard and imitated by the hearing child, excite sound images in his mind. The sensations arising from the articulation of vocal sounds being thus transmitted to their proper centres in the brain, are therefore capable of fulfilling the same functions, and serving the same purposes in memory and thought as sound-sensations. The deaf-mute, in fact, acquires an "internal speech" in all respects the same as that of the hearing, the element of sound alone being absent. This fact is often disputed, and the speech of the deaf described as "mechanical," *i.e.*, having no relation to the intelligence, but it is fully confirmed by the experience of the oral deaf. The failure of many of the orally-taught deaf to make a free and natural use of speech is due, not so much to any imperfections in their vocal utterance as to a lack of the necessary aptitude to use the forms of speech as a mental language, or in other words, they fail to assimilate speech sufficiently to the processes of mentation. Such aptitude to make mind and voice react quickly on each other is dependent on a high physical condition and mental alertness to a greater extent than in those who hear, for a low or anæmic state of body or weak mental power, or both, are not favourable conditions for the development of the mental language of touch derived from the process of articulation. To sum up—

1. Touch is the primary and most fundamental form of perception.

2. Highly developed in the lips and tongue, it is a necessary condition of the acquisition of speech by imitation and practice: in the hearing, by the aid of the ear; in the deaf, by that of sight.

3. This is in accordance with what Baldwin calls the principle of *Kinæsthetic Equivalents*, which expresses the truth that we must have some thought or mental picture in mind which is equivalent to the feeling of any organic movement we desire to make, so that we cannot acquire or use speech without a store in memory of the equivalent movements derived from the sense-experience of touch and hearing or touch and sight.

4. As a source of ideas and conceptions of the kind that remain in the mind the intellectual value of touch is of a high order.

5. The mental images of speech furnished by the sensations of touch, associated with their names, are, under favourable conditions, as capable of the same intellectual functions and of serving the same purposes in memory and thought as the mental images of sound.

6. The deaf can therefore be taught so as to *think* and *speak* as the hearing do.

Hearing. As from the importance of sound in relation to speech, the organ of hearing and the mode in which the voice is regulated by its action in the production of the speech-sounds are fully described elsewhere, we shall merely state, *en passant*, that the intellectual value of hearing is due to the high degree of definiteness of its sensations, chiefly in their *qualitative* character. On the other hand, it gives no direct knowledge of the external world in its visual and æsthetic aspects. In this respect the congenitally blind are at a vast disadvantage compared with the deaf. The associated sensations of touch and sight are, other things being equal, of greater utility and afford a wider range of sense-experience and knowledge than those of touch and hearing.

Relation of Hearing and Touch to Sound. Arnold in the original edition of this work, and in his other writings, constantly speaks of the sonorous vibrations of the voice as having two distinct elements, one auditory, perceptible to the sense of hearing as sound, the other tactile, perceptible to the sense of touch only; and, indeed, goes so far as to state that "sound is vibration appreciable by the ear and at the same time appreciable by touch"; "both senses find their unity in the vibrations which have sound as *one* of their effects"; and that "touch is cognisant of the vibrations, which are the fundamental element common to all sensation, and of which sound itself is only a special phase." Certainly sensation ultimately depends on molecular movements or vibrations, but as each sense, strictly speaking, has only that form of molecular or vibratory movement or stimulus to which it is properly responsive, it is, to say the least, doubtful whether there is a tactile element in the vibrations of sound distinct from their auditory element and perceptible by touch independently of it. It is only at their *lowest* limits that sound vibrations appear to be continuous with vibrations as detectable by touch, and at the most, as M'Kendrick and Snodgrass remark, "in the phenomena of beats we seem to find a link between the sensation of touch and that of hearing, the *tactile* element (variation of amplitude) being superposed upon the auditory element (constancy of pitch)." The deaf commonly say they "feel" sounds, but the word is simply used in a tropical or metaphorical sense.

The writer ventures to think the facts to be these. Deafness is seldom, if ever, absolute; hence the deaf may hear their own voice slightly, increased as it is by the effects of resonance within the skull, without being able to distinguish its differences of pitch and quality. When they learn to speak, they have, first, that general idea of the positions of the organs proper to each sound, which is obtained from their contact with one another and felt by touch, then the sonorous vibrations caused by the voice, reverberating in the mouth, are conducted as an *auditory* sensation through the bony parts of the head to the auditory centre in the sensorium. When by his hand the deaf person "feels" the vibrations of a sound uttered by another on the latter's throat, the vibrations, somewhat deadened by the fleshy parts intervening, are conveyed as auditory sensations through the bony parts of the body to the brain. But when a sounding body is placed against his teeth, the vibrations are much more acutely perceived than when it is in contact with the fleshy hands.

It is the union of the tactile sensations of the vocal organs and the auditory sensations of the vocal vibrations which gives to speech that intuitive value for mental purposes on which Arnold rightly lays so much stress. That there may be a slight tactile element in the *intensity* of a sound is very probable, and it may exist in the deaf-mute's sensory perception of his own voice, but it certainly has not that importance and independence Arnold would assign to it. Of course this does not in the slightest degree militate against his arguments in favour of the teaching of speech founded on the intuitive value of the sensations it occasions in the deaf. Whatever else is doubtful, it is a well attested fact of experience that to the oral deaf vocal sounds are not merely mechanical and lifeless movements, but possess sufficient intuitive reality to place them in the same mental conditions and relations as those who hear.

It may be broadly stated that, although the deaf do not hear sounds as such, either by the ear or mentally, their place in the mechanism of thought is taken by the sensations of the vocal vibrations in association with the tactile sensations of the organic positions required for the articulation of the speech-sounds.

The most effective use of the sense of touch, as Arnold showed, is to excite first the organs of speech to their full natural exercise, and then the mental images of their positions in the voluntary imitative reproduction of the speech-sounds, when the hearing is lost.

Sight. Upon the whole no other sense fills so large a place in our mental equipment as sight, and a close analysis of our highest conceptions shows how largely light and its effects enter into them. It is the highest and most refined of all the senses, surpassing the others not only in the delicacy of its organ but in the range and clearness of its sensations, and, in short, as expressed in the well-known lines of Newman, it is

> ". . . . . . . that princely sense
> Which binds ideas in one, and makes them live."

The characteristic elements of the sensations of sight are the *intensity, quality,* and *local distinctness* of visual impressions, supplemented, as in the case of touch, by the effects of the muscular activity of the eye.

It is scarcely necessary to say how the loss of hearing immeasurably increases the value of sight to the deaf. Nothing should be left undone for its due preservation. Schoolrooms should have an abundance of light and the eyes should never be unduly strained, especially in childhood. Whenever they show signs of disease or deterioration so that glasses have to be used, the advice of a qualified oculist should be invariably obtained and acted on.

It is commonly supposed that deafness entails *extra* work on the sight, and that it is consequently *keener* in the deaf than in those who hear. Such a view is entirely erroneous. It is true the deaf have to depend more on their eyes, but this is merely an altered state of attention which becomes habitual, and any aptitude in special directions, *e.g.* in lip-reading, is the result of training and not of any stimulus due to some supposed effect arising from the loss of hearing.

SECTION IV.—LANGUAGE AND ITS FORMS OF EXPRESSION.

Language. We have seen that the uneducated deaf, compelled to communicate with others, use for the purpose, a rude gesture language, which they have invented by imitating the object or action they wish to signify. This fact renders necessary a brief review of the different ways in which we can express our feelings or thoughts and their relation to one another.

Language, as a term, is in common usage restricted to and synonymous with speech or its graphic representation in writing or printing. But this use of the word is both incorrect and misleading. Our ideas being mental pictures, and purely representative of sensations, have no real existence apart from the recipient mind ; and therefore we require some form of giving outward or sensible expression to them if we are to make others acquainted with them. Whatever this form may be, if it answers the purpose of reproducing our ideas in the minds of others it is language.

Language may be defined as *whatever expresses and makes known our feelings and thoughts to others,* or, in other words, *a system of commonly accepted forms or symbols by which all our thought can be communicated to others or theirs to us.*

These forms differ so much from one another that they require classifying. They may be conveniently classed as *Natural* and *Conventional* or *Artificial Language*.

Forms of Language. 1. NATURAL LANGUAGE.—This includes all those forms of expression which, being a reflection of and inseparable from the ideas signified, are intuitive, self-explanatory, and therefore instantly understood by all. They are, moreover, incapable of being reduced to rules of grammar or of being transcribed.

(*a*). The first and most obvious is *Simple Expression*, which comprises the neuro-muscular reactions of states of feeling, such as are exhibited in crying, smiling, laughing, frowning, which signify pain, pleasure, anger; and in other actions indicating fear, horror, surprise, pity, etc. They are partly instinctive and partly acquired and are the simplest and most direct of all our forms of expression, and the least dependent on will and habit. Such actions are usually very pronounced in the young deaf and are a great aid to their gestures. Expression by itself, however, is hardly language in the proper sense, but on the other hand, as it fills no inconsiderable part in the active interchange of our ideas, it must be included as a factor. *Dramatic gesticulation*, as used with speech, although quite different in origin and purpose, may, perhaps, be included in this category.

(*b*). Next come *Mimic Gestures* and *Pantomime*. A mimic gesture is a simple effort by means of an imitative or descriptive motion, chiefly of the hands, to express our conception of some object or action, as, for instance, in putting the fingers together, bringing the tip of the thumb round to them so as to form a circle, and then raising the hand to the open mouth so as to imitate the action of *drinking*. When several such gestures are reproduced serially so as to signify a more complete action or event, or several of these together in a succession of tableaux so as to reproduce life pictorially, a pantomime is the result.

Such modes of expression are the natural resource of the uneducated deaf in the absence of speech, and in their simplest form, as understood by all mankind independently of speech, are commonly called *natural signs.* All forms of language are really "signs" of the ideas intended to be expressed, but in relation to the deaf, this term is ordinarily restricted to that class of motions which, from repetition and usage, come to be an accepted mode of expression with them. It is perhaps hardly necessary to state that the term "pantomime" must not be confounded with its ordinary modern acceptation. The *pantomimi* of the ancient Greeks and Romans acted entirely by the art of imitative action and gesticulation in dumb show, and to such perfection was it carried that some of them could express in mimic language everything they wished.

(*c*). The art of *Delineation*, *Drawing*, or, as the French more tersely put it, *Dessin.* This mode of conveying ideas to others by simple pictorial representations of visible objects had a very early vogue. But in course of time, as the necessity of greater conciseness in expression was felt, these pictures were gradually reduced until they acquired a conventional form as *ideographic* writing, as is exhibited in the hieroglyphics of ancient Egypt and in the Chinese language. The former became further reduced to phonetic symbols, and the latter, although still retaining its ideographic form, has largely lost its pictorial character, without, however, going beyond the primary stage to become truly phonetic like the European alphabets, for it imposed its forms on the Chinese speech, instead of speech imposing its on their writing.

2. CONVENTIONAL OR ARTIFICIAL LANGUAGE.—This comprises all those forms which have no necessary or natural relation to the ideas expressed, and the meaning of whose symbols, being the result of convention, is therefore purely arbitrary.

(*a*) *Signs* or the *Sign Language.* When natural signs have been constantly used by the deaf they tend to undergo a process of reduction and abridgment, until only the distinguishing feature of the idea or object is left, which is sufficient to recall it. Conjoined with other signs either having only a remote analogy to the ideas or purely arbitrary, they constitute the sign language as developed and used by the deaf and their teachers in the sign system of education. Although mimic in form and containing a large proportion of the truly mimic element, it is so destitute of pictorial character as to be quite unintelligible to the uninitiated, and hence is strictly conventional. But the truly mimic element, natural and universal, must be carefully distinguished from the artificial element, which may vary so that a set of signs used in one locality may in another not be understood.

There are two ways in which the sign language may be employed. The first is when the signs are arranged and used so that they conform to the order and grammatical forms of spoken language. They are known as *methodical* or *systematic* signs, but in practice this order is hardly, if ever, observed. The second is when the signs are permitted to follow the natural order proper to their character and structure. This order is not that of the spoken languages, but somewhat inverted, and depends on the order of the genesis of ideas, the most important or dominant coming first, and the rest according to their relative importance. Thus the sentence *A man cuts a tree with an axe*, in signs would be like this, *tree man cuts* or *tree cuts man*, the axe being included in the sign for felling a tree; and *Who has beaten you?* becomes *You beaten, who?* But the peculiar order of the sign language will be best seen at length in the Lord's Prayer, as follows:—*Father our—heaven in—name thy hallowed—Kingdom thy come—will thy done—earth on, heaven in, as. Bread our give us daily—trespasses our forgive, them trespass against us, forgive, as. Temptation lead not—but evil deliver from—Kingdom power glory thine for ever.* To make signs conform to the artificial order and forms of spoken language is contrary to their genius and a violation of the mimic principle, while the introduction of the artificial element is a confession of their inadequacy to indicate the complex relations of words by means of particles, inflexions, and other grammatical expedients. The sign language, in fact, although it conforms to a certain order, has no grammar, and such syntactical character as it possesses is due to a necessary relation of ideas which is expressed by apposition or juxtaposition rather than by subordination. The reciprocal dependence and logical relations of ideas in the sign language are thus expressed not, as in the spoken language, by special relating symbols, but by a natural arrangement which explains their meaning. In order to facilitate the expression of ideas, tropes are more freely used in the sign language, especially synecdoche, *i.e.*, the whole for the part or the part for the whole, and metonymy, as in using the signs for *hard* and *soft*, to signify *difficult* and *easy* respectively.

Two peculiarities of the sign language, due to its mimic and elastic structure, must be mentioned. One is that it is *self-defining*, *i.e.*, it can be analysed at once, and the meaning of its component signs ascertained or mutually explained. The other is that it cannot be directly *transcribed*, for when interpreted orally or by writing, the process involves a change from one form of language to another, *i.e.*, *translating.* Hence the deaf educated chiefly by the sign language have to learn and use *two* languages before they can be in a position to communicate with the speaking world. It will be readily understood that as it cannot be transcribed, the sign language has no alphabet, and consequently no means of fixing thought in the form of literature.

Its mimic and plastic form imposes limits on the sign language that render it impossible or inadequate for the expression of logical relations and abstract ideas, which can only be indirectly suggested through analogy to the concrete by a roundabout process, and it is therefore incapable of directing thought to a definite end, and of serving the higher intellectual activities.

The elements of the sign language are not easy to classify; they may however be arranged in several ways according to the standpoint from which they are considered.

1. Mimic signs proper—that for a *knife* or *axe*—and arbitrary motions having either a faint analogy to the idea which it is intended to suggest, but not describe—those for *soft*, *hard*, *which? what?* and those indicating difference or likeness; or no analogy at all—those for *good* and *bad*.
2. Abridged and developed signs.
3. Radical and derivative signs. Practically these and the preceding are the same. The former in each group indicate some feature common to a class of objects, and the latter some special feature of a particular object in that class. Thus the *roof* of a house may be the radical sign for all buildings, the particular kind being indicated by some special feature derived and amplified, as a *church* by the sign for a *spire*, or to use a trope, by that for *prayer*.
4. Indicative — pointing to the object intended; imitative or configurative — representing by drawing in the air; operative—representing actions; and expressive—facial expression.
5. Simple and compound. The former include signs for simple things or actions such as *knife*, *walking*, the latter those for more complex ideas, as *horseman*, *doctor*, *rich*, *manufacturing*.

Unqualified assertions of the impossibility of forming clear conceptions by signs alone are sometimes made. It is true that signs are on a much lower plane than speech in this and other respects, but there is nothing in their nature to prevent them from becoming, from long use, mere symbols, and thus serve the same end as spoken or written words. On this point the authority of Lotze is conclusive. In his *Logic* (bk. I., ch. 1) he says:—

"The development of which the ideas of the deaf are capable, though guided in the first instance by those who can speak, is enough to show that the internal work of logic is independent of the possibility of linguistic [oral] expression. . . . No one doubts the extremely effective support which [oral] language gives to the development of thought by making the formations and transformations of ideas vividly objective to consciousness by means of sharply defined sounds and their regular changes; still if some other mode of communication were natural to man instead of the language of sounds, the same logical distinctions would find in it a corresponding expression though of a different kind."

(b). Speech. That speech is a conventional and acquired form is alone proved by the fact that the same ideas are expressed by different combinations of sounds in the languages of the world. It is its immemorial and universal use that makes it seem the natural, supreme, and only mode of expressing thought—the survival of the fittest—and makes words and sounds seem as if they were one and indivisible. The subject will be fully dealt with in connection with the oral system. We may here remark that the indisputable superiority of speech to signs is due (1) to the simplicity and capability of infinite combinations of speech-sounds, permitting their direct association with every possible idea, (2) to the freedom of speech-sounds from the confusing material associations of signs, as well as to their distinctness and uniformity, and (3) to the definite character and orderly sequence of the sense impressions of sound in the brain, rendering it a more economical and quicker instrument of mental action than motley visual signs.

With speech may be classed *lip-reading*, in which the speech-sounds, instead of being heard, are revealed to the eye by the partially visible action of the organs concerned, together with the associated facial motions and expressions, and may thus be made a means of expressing thought to those who do not hear the sounds. As lip-reading depends on and is bound up with speech as cause and effect, their relation to each other is strictly natural.

(*c*). *Writing.* By means of alphabetic writing and printing speech can be directly transcribed and retained in a permanent and visible form. This is done by the association of certain characters with the phonetic elements of speech as their symbols, and were this completely carried out the correspondence would be exact, but unfortunately this is not the case. The inconveniences arising from this are, however, to a great extent minimized by habit and use.

Writing is of inestimable value to the deaf who do not learn to speak, as the written words can be directly associated with the ideas or objects signified, which can thus be named as well as by hearing the sounds.

The *manual alphabet* is a mode of presenting the letters of the alphabet to the eye by spelling on the fingers, and is to be classed with writing, as lip-reading is with speech, with the difference that its forms have no necessary natural relation to those of writing as in the case of lip-reading and speech.

Speech, lip-reading, writing, and the manual alphabet, from their correspondence and consequent interchangeability, are sometimes classed together as *verbal* forms of language.

CHAPTER II.—The Problem of the Education of the Deaf and its Solution.

Section I.—Methods of Education.

When the ordinary hearing child begins his education, his teacher finds him already provided with the vernacular gradually acquired in his home life and able to express his simple ideas and wants in it. He has thus a starting-point on ground common both to himself and his scholar, and has little more to do than develop and perfect his scholar's language and proceed at once to instruct him in the special branches of ordinary education. Even the hearing child who never goes to school is, as he grows up, in a sense educated by the constant use of his vernacular in the intercourse of the world, and obtains a certain stock of knowledge and experience.

But not so with the deaf-mute, who comes to his teacher quite destitute of spoken language, and using in its stead a crude gesture language, which has so far been of scarcely any intellectual value.

The teacher has at the very outset not only to create anew the conditions necessary for the acquisition of language, but if he does not adopt the deaf-mute's gesture language, has also to replace it with his own vernacular and train his scholar in its use before he can even begin the most elementary education. But this is not all, for as Vatter has very clearly pointed out, the prime obstacles to be surmounted by the deaf in the acquisition of verbal language do not lie in its exterior form, but in its contents; not in its external comprehension and application, but in its internal assimilation as an intellectual possession. *The first and principal aim in the education of the deaf is thus the acquisition and correct use of verbal language.*

The problem, then, is two-fold: the choice of the form of language with which the deaf-mute has to be provided in order that he may acquire and assimilate, directly or indirectly, the vernacular of his country; and of the method of teaching that will best give him a knowledge of its proper use and application in education. There are, broadly speaking, three ways in which the problem has been solved.

1. By the *Manual (Silent) System*, in which natural signs, the sign language, writing, and the manual alphabet are employed. It comprises the *Sign* and the *Manual Methods.*

2. By the *Oral System*, in which natural signs (at the beginning only), writing, speech, and lip-reading are employed. It comprises the *Auricular, Oral*, and *Pure Oral Methods.*

3. By the *Combined System*, in which all the means included in the two other systems are simultaneously employed in varying degrees, giving rise to various

methods which may be reduced to two, the *Combined Method* proper, in which either a silent form of language or speech may be the basis and chief means of instruction; and the *Verbal Language Method*, or shortly *Verbal Method*, in which the sign language alone is totally excluded.

It may be observed that the term *system* is used here merely for convenience in classifying: the term *method*, as defining a process for attaining particular results by a course of education founded on definite principles, is in practice more commonly used.

SECTION II.—THE MANUAL (SILENT) SYSTEM.

The Sign Method. In this the sign language is the basis and chief means of education throughout the course, supplemented by writing and the manual alphabet. This method, originated by the Abbé de l'Epée, is now in principle discountenanced by leading teachers, and we shall only deal with it further here in order to notice some of the reasons which have led to its virtual abandonment.

We have seen that the sign language differs from spoken language not only in *form*, but also in the *order* of its terms and its *syntactical* structure, so that the deaf-mute wholly educated by it as his vernacular acquires the English or any other spoken language by a process of translation. His position is thus similar to that of an Englishman learning French through his own vernacular. Nor is this all, for while in the latter case the correspondence of form between these two languages involves only a mental conversion of one set of symbols into another similar to it and so simplifying the process of translation, in the case of the sign taught deaf-mute the process is one from a mimic to an artificial form, or *vice versa*, involving a mental conversion between two altogether dissimilar sets of symbols, and causing a perpetual mental rearrangement that increases the labour of learning the artificial language, confuses thought, and makes composition defective.

This difficulty in co-ordinating the pictorial sign language with the artificial and vocal English, so as to set up identity of thought and expression between them, is the real cause of those mistakes in the composition of the deaf well known as *mutisms*, which in many respects resemble the mistakes our Englishman makes when he attempts to write French.

There is another fact to be considered in this connection. The same law which makes sounds the *couche*, or sense form of our mental language, also acts to make, first, natural signs, then the sign language the sense form and vehicle of thought with the deaf, and undoubtedly their necessities operate so as to render them germane to their nature and proclivities. If the teacher will carefully realize these two facts, that the deaf once habituated to the use of signs, think in them and will continue to do so, and that their form and order cannot be assimilated to, or, for the matter of that, easily replaced by those of the spoken language, he will possess the key to the difficulties of educating the deaf in verbal language. It is commonly said that the sign language is the natural language—the language *par excellence*—of the deaf, and had they their own world only to live in, much might be said in favour of this view. But the truth is that signs are "natural" to them simply because necessity—the mother of invention—has made them so, and not from any innate tendency. Our duty is to endeavour to restore the deaf to the same habits of thought and expression which those who hear have, and this can only be done by anticipating their "natural" impulse to that form of language their necessities impose on them.

The practical inconveniences of the sign method were to a great extent obviated by the use of writing and the manual alphabet, so that the adult deaf were able in some measure to understand the language and literature of their country, as an Englishman might that of France, without any conscious mental translation, although, like him, they were rarely able to write correctly. This fact, although it might appear to mitigate the severity of the general condemnation the sign method has justly received, does but intensify it, since it has none the less failed to make the spoken language the vernacular of the deaf.

The Manual Method. This method relies chiefly on writing and the manual alphabet, with a limited use of natural signs. The object is to impart a direct knowledge of verbal language without the injurious effects of the intervention of the sign language. Compared with the sign method, it has the apparent advantage in using only the English vernacular in direct association with ideas and objects, so that no translation seems to be required. It is, however, very doubtful whether a form of mental reproduction in which written letters only are the signs of conceptions, even if barely possible, is practicable. Only a direct mode of expression originating in mental activity, such as speech or signs, can fully serve as a vehicle of thought. Writing—including the manual alphabet—being isolated and its function interpretative, it cannot so well serve the same purpose, and a method based on it does not render signs superfluous as a mental language, although it would reduce their detrimental effects on the acquisition of verbal language.

With all its drawbacks, the manual method is the only one for those of the deaf who, although their vocal organs may be normal, from a low mental condition and other militating causes, are unable to learn either to speak at all or to speak sufficiently well to benefit by ordinary oral instruction. The manual alphabet, from its more vivid and rapid mode of presentation, should be used as much as possible, and writing only for the ordinary purposes of instruction.

SECTION III.—THE ORAL SYSTEM.

The Auricular Method. This method endeavours to make use of and develope any hearing that may be left to the deaf-mute in order to enable him, not so much to hear others speak, as to improve his own acquired speech by giving him some idea of sound, and indirectly to increase its intuitive effects. This is usually done by the aid of instruments specially adapted to increase the hearing power. In other respects the method does not differ from the oral, and is not of much importance, as only a very small number of cases can be successfully treated.

The Oral Method. The oral and pure oral methods differ from each other chiefly in the extent to which the use of natural signs and writing is admitted. In practice, however, the distinction is one without a difference, and the two will be treated here as one.

The oral method, as its name implies, not only artificially teaches speech and lip-reading, but makes them the basis and exclusive means of the education of the deaf in language and knowledge. Speech alone, however, is physiologically and practically the backbone of the method. The organs of speech of the deaf are presumed to be in a normal condition, so that after proper instruction they may be capable of using them just as if they heard. The object of the method also is to bring the deaf into an intuitive relation to speech as the instrument of thought, so that, mentally and practically, they think and speak in the same manner as those in possession of all their senses. This is effected by *associating the instruction in speech with that in verbal language from the first,* so that the two are united, and spoken language becomes the vernacular of the deaf. This language is, moreover, given to the learner, not in the imperfect and unsettled forms of the sign language, or the dead forms of writing, or the fleeting forms of the manual alphabet, but in its most perfect and definite form, direct from the seat of mental activity and endowed with its life and potentiality. He is thus at once placed on the same plane as his hearing fellows in respect to their vernacular and literature.

The teacher must clearly understand that the object of the method is not merely the teaching of articulation, as a mechanical production of sounds, but their direct association with ideas and their names as spoken language, which is at once the means and the end of the course of instruction.

The natural signs of the deaf are permitted in the early stages as a necessary means of communication and moral discipline until the learner is in a position to dispense with their use. But the teacher must be careful not to make a regular use of them as language, or in any way to develop and add to them, always remembering that signs and speech are not indifferent expedients to be employed or abandoned at pleasure. Each is a master principle which determines the form in which thought will be mentally expressed, and the one which gains the priority will keep the field and exclude the other. In principle there is no valid objection to the manual alphabet as a means of communication, but as it diverts the attention which should be given to speech and lip-reading its use is inexpedient, and it is altogether excluded by the pure oralists. If used at all, it should only be to supply the occasional deficiences of lip-reading.

Writing, while it should be associated with speech from the first, should be strictly subordinated to it as a means of instruction and according to the exigencies of the course of education.

The strong predilection the young deaf have for signs in their intercourse is admittedly a difficulty to the oral teacher, and without tact and firmness in dealing with it may even prove a serious hindrance. But he must frankly face them, and under no circumstances whatever should they be forcibly repressed, nor their use made a matter of punishment or sumptuary rules, for not only would this set up a false standard of right and wrong, but tend to disgust the deaf with speech itself. While excluding signs altogether from the work of the school and on formal occasions, the junior children should mostly be left to their own devices when by themselves, but with the elder ones much may be done to encourage the use of their speech by personal influence, a sympathetic attitude, and above all by an appeal to their pride and sense of what is correct and becoming. In the long run the good effects of regular oral teaching, consistently followed, will tell, and no serious effects need be apprehended from the "signing" propensities of the deaf if kept within bounds. The writer is of opinion that when, as is often the case, oral pupils are acquainted with the manual alphabet, they should be made to spell properly on their fingers as a better alternative to signs. The fewer pupils there are together the better can the propensity be controlled, and best of all when the teacher has only one, as in private families.

One or two of the more weighty objections usually made to the oral method *qua* method may be noticed here. The first is that as speech is an audible form of language addressed solely to the ear, the deaf can only be educated by one addressed to the eye, and hence that all attempts to substitute an audible for a visible language are contrary to nature, and that consequently the speech of the deaf is at best a merely artificial expedient, the exact value of which they are unable to gauge, thus rendering it uncertain and variable, and of little or no educational value. To this, it may be replied that the oral method is not and does not pretend to be a *perfect* substitute for the educational processes based on hearing; but that its process is nevertheless rational, and its objects within certain limits attainable with a large number of the deaf, because they are in accordance with known psychological laws as to the relations of speech and mind independently of hearing, and are in no degree militated against by such imperfections of vocal utterance as may be due to the lack of the guiding power of the ear.

A second objection is, that owing to the necessity of spending so much time in acquiring the mechanical part of speech, its use as a means of communication is delayed, and mental development and the acquisition of knowledge hindered, and moreover that the conditions of the method render the work irksome and tedious to the deaf. It must be admitted that during the early stages of the course progress is slow, but on the other hand this is more than compensated for by the progress made in the advanced stages, which is relatively more rapid than if the method had not been employed from the first, and the feeling of irksomeness, which, by the way, does not always exist, passes off as the pupils get more habituated to the use of spoken language.

A third, but minor, objection is that there are always a number of comparative failures under the oral method, but it is also true that there are comparative failures under the manual or any other method. They do not disprove the merits of the particular method followed in any case, and in that of the oral not to the extent alleged.

Section IV.—The Combined System.

The Combined Method. This method is eclectic, as proposing to select and unite the best features of the two other systems with the idea, rightly or wrongly, of advancing the general education of the deaf more rapidly and easily by using all available means. In other words, what each system is supposed to fail to do singly is to be be accomplished by uniting them. Owing to its complex character, the combined method is difficult to define, and no attempt has been made to give it a formative logical principle or to reduce it to a consistent and systematic form. Nor is there any clear determination as to which of the various means employed—signs, writing, the manual alphabet, or speech—is to occupy the primary place and become the vernacular.

One thing, however, is quite clear. In this method *the instruction in speech and that in language are not united* as in the oral, but are treated as separate branches of education. The distinction is perhaps not very apparent in practice, when, as is generally the case, speech is used as a means of communication between teacher and pupils in the later stages, but nevertheless it exists, and is fundamental, affecting the character of the whole course of education. If signs are made the chief means in teaching verbal language and become the confirmed habit of thought and expression, speech is reduced to the rank of a mere "accomplishment," and lacking the power of a living language and being little more than a set of organic movements, stands apart from ordinary mental habits. It would only be resorted to on compulsion rather than for free expression, and would soon give place to signs, writing, and the manual alphabet. If one of the principal objections to the oral method—that the scholars when they leave school soon cease to speak and resort to signs—has any force, much more can it be urged of teaching speech by the combined method. There is the less justification for giving speech a secondary place, when all that is needed to make it the chief means of thought and intercourse is perseverance on the part of the teacher and ordinary ability on that of the scholar. But if speech is made the chief means, the introduction of a different form of language—signs—is unnecessary, confusing and vexatious, and deprives both teacher and scholar of all incentive to make speech of real use. It is far better to keep to a definite method with a definite aim, for the two cardinal principles of the sign and oral systems are mutually exclusive as formative elements of thought. In fact, many of the advocates of the combined method, including Mr. Addison, one of the authors of *Deaf-Mutism*, recognizing this, begin with writing as a means of teaching language before speech and lip-reading are fully developed. But the most recent and weighty indictment of the method comes from one who had every prepossession in its favour. Herr Heidsiek, to whom we have referred in the Historical Sketch, after laying down that (1) "the deaf-mute must learn verbal language and must be rendered capable of thinking in the forms of this language, and of making himself understood orally and in writing," and (2) "the instruction given in schools for the deaf must, from the beginning, and through the whole course, develop both mind and language, and conform to the individuality of the deaf," says, "though the combined system fully comes up to the requirements of the second principle, there are serious objections to be raised against its official permission of the unrestricted use of signs, which jeopardizes the acquisition of verbal language, and thus the conditions of the first principle. As a matter of fact I had to observe in various schools using this system [in the United States] that the upper classes did not realize the expectations justified by the younger ones, and that verbal language was retarded in the same measure as the conventional sign language pushed itself forward and became the mode of thought of the pupils. Therefore, though possessing marked advantages over the pure oral method, the combined method cannot be regarded as the ideal method and is, therefore, probably doomed to extinction."

The Verbal Method. In this method signs are entirely excluded, as in the oral method, from which it differs in *admitting to the full the manual alphabet*, and in the relative importance attached to writing and speech as means of instruction. If the suppression of the sign language, not only in but outside the school, is to be regarded as a matter of prime importance, there is undoubtedly much to be said for this method, and on that ground it is much to be preferred to the combined method. It may also be serviceable in many cases where speech and lip-reading, while useful to a limited extent, are yet not sufficiently intelligible or developed to dispense with the aid of the manual alphabet.

From this brief survey it will be seen that all the methods agree in at least two respects—the necessity of depending at the beginning on natural signs to an extent varying according to circumstances, and the use of writing to a greater or less degree as an adjunct to language teaching. And, further, it will also be seen that, regarded from the standpoint of this work, which excludes the sign language, while *not all* the deaf can be taught by any one method, *all* can be legitimately taught by one or other of these three methods, the manual (as defined here), the oral, and the verbal, according to their individual necessities and capabilities.

Various estimates have been made of the proportion of the deaf who can be profitably taught by the oral method, but they vary according as an optimistic or pessimistic view is taken of its possibilities. The great majority of the deaf can undoubtedly be taught to speak, or rather articulate, but this is not quite the same thing as saying that they will all benefit in an equal degree by their speech, either educationally or socially. Usually, more stress is laid on the educational than the social aspect of the question, and viewed in this way, 75 per cent. may be taken as the maximum of those who can profitably be educated by the oral method. At the Pennsylvania Institution the percentage is as high as 90, and on this point the opinion of its principal, Dr. Crouter, may be quoted, "After twenty years' experimentation with and comparison of methods, the school has arrived at the conclusion that proper oral methods—meaning the use of speech and speech-reading, writing, pictures, and the free use of books—are fully adequate for the best education of the deaf, and that when a deaf child cannot be so educated it is useless to hope for any marked success under any other method"—which simply means that the educational efficiency of the oral is higher than that of any other method.*

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*It may be explained that the "Sign Method" here corresponds to the American "Manual Method," except that in the latter less prominence is given to signs as an exclusive means of instruction than is implied in the former term. Similarly the "manual method" here corresponds to the American "manual alphabet method," the special form of which carried out at Rochester, N.Y., is the "verbal method" here. So long as the reader has a thorough grasp of the principles underlying the different methods, the particular terminology employed is of only secondary importance, indeed, where signs are recognized and used at all, it is apt to be elastic in application.

SECTION V.—THE SOCIAL RESULTS OF ORAL METHODS OF EDUCATION.

The above subject is not usually included in works of this kind, but it is obvious that if reliable evidence of how the oral deaf get on in the world at large were forthcoming, it would throw much light on the whole question of their education by confirming the validity or otherwise of the method of instruction pursued. But owing to the variable character of the results of the oral method, depending on so many indeterminate circumstances, it is difficult to obtain such a body of facts in regard to them as would enable the teacher to estimate the efficacy of his work and ascertain to what special points his attention might most profitably be directed so as the better to secure the desired end. The writer ventures, therefore, to submit a few notes based on his personal experience by way of elucidating these points.

There are two things that must be borne in mind in considering this subject. The first is that the experience of the oral deaf in the school is no criterion of what it subsequently is in the social life of the world. Children and their teachers, who live together for years in the school, get accustomed to one another, so that, no matter what the method may be, they understand one another, and everything proceeds quite satisfactorily. But away from the tutelage of those who understand them, the deaf, whether orally or manually taught, are placed in new relations and new conditions that test their resources to the utmost. The second is that many of the oral deaf are in a more favourable position than others of the same class for the exercise of their special attainments. One may be surrounded by all the favouring circumstances of wealth and sympathetic friends and so may do well, while another, perhaps equal to him in education, has to endure the strain and stress of life, and shift for himself in a hard and unsympathetic world, and very likely finds the same attainments of little practical service. Such differences of situation must be honestly taken into account in estimating what speech and lip-reading are exactly worth apart from the school and home.

It is important to realize clearly the fact that in the great majority of cases the oral method does not and cannot restore the deaf to social life in the sense of placing them on such an equality with their hearing fellows as to make their deafness practically non-existent or even not suspected at all. Much harm has been done by exaggerated expectations founded on imperfect or illusory data, and disappointment caused by the limits of the oral attainments of the deaf not being understood. The ability of the oral deaf to speak does not always mean that their speech is intelligible to everybody, nor does the ability to read the lips of one person mean ability to understand all. This arises from the fact, (1) in regard to speech, that however accurate the articulation may be, it usually lacks the peculiar quality which can only be acquired by the hearing, and renders even the most indistinct speech of those who hear generally intelligible ; and (2) in regard to lip-reading, that no two persons speak in exactly the same manner, and hence not all can be equally understood by the oral deaf ; and that as its practice involves certain conditions, they are not in general able to follow the ordinary conversation of others *not specially* addressed to themselves, far less public speeches, sermons, and lectures, which are usually beyond the ordinary powers of lip-reading.

In general, oral intercourse presupposes that those with whom the deaf converse, know at the outset with whom they have to do, and are accordingly prepared to make all allowances for their peculiarities of speech, etc., and, moreover, understand that it is necessary to speak slowly and distinctly so that their deaf interlocutors may be able to read their lips to some purpose. All this means, in other words, that as a preliminary to successful oral intercourse with the deaf, those who hear require to be initiated into the art of oral conversation with them. Of course it is not for a moment to be inferred that oral intercourse with *strangers* is impossible, for there are, as will presently be shown, numerous occasions when speech is really of great use without necessarily involving lengthened conversation on both sides.

The ideal oral deaf person is one who, in addition to the ordinary educational attainments, can speak distinctly and fluently enough to be generally understood, and is a sufficiently expert lip-reader to follow the speech of those who, at the least, know him. But it is seldom that all three are found combined. A dull person may either be a good speaker or a proficient lip-reader, if not both, while a highly educated person may be only either the one or the other, or even neither. Still, it may be said that, as a rule, high mental capacity goes either with good speech or good lip-reading, if not both. The balance of advantage is most certainly with the oral deaf person who can speak well rather than with the one who can lip-read well, when the two do not occur together. Put the former in the company of a total stranger, and the chances are that he will be able at once to explain his position and perhaps enable the stranger in turn to speak to him according to the "rules of the game." But if the deaf person is not understood, his lip-reading, however good it may be, will not help matters much.

To sum up, then, the following social results may be regarded as the utmost that can reasonably be expected of the oral method in an ordinary case :—

1. Ability to speak and lip-read sufficiently well to carry on conversation with the members of the family, intimate friends, and those with whom he may be constantly associated in business, as master and apprentice, clerk, or workman, partners, etc., but this need not be invariably expected, so much depending on personal idiosyncrasies.

2. Ability to speak and lip-read sufficiently well to converse on familiar subjects with intelligent strangers who have been previously initiated by mutual friends, or in favourable circumstances or cases of necessity, by the deaf person himself, into the art of oral conversation with the oral deaf.

3. Ability to speak sufficiently well to make his wants understood in shops, hotels, on the railway, and such like occasions, but not necessarily involving lip-reading to any great extent.

4. As a rule all conversation would be special, *i.e.*, the hearing person would have to address himself directly to his deaf interlocutor. The general conversation of other persons—as, for instance, at table—is very seldom followed by an oral deaf person, beyond possibly gaining some idea of the subjects discussed.

These limitations must be taken in a very general way, as the exceptions are almost endless; for instance, a total stranger who has been initiated into the art of oral conversation with a deaf person will very often prove at once a greater adept in this respect than one of the latter's own family circle; indeed, in the writer's experience, the intelligibility of his speech, or his ability to lip-read, has frequently been independent of the length of acquaintance or degree of intimacy of his interlocutors, although, of course, other things being equal, these factors prevail in the long run. In short, the art depends very much on circumstances which cannot always be foreseen.

There are some who, having formed unduly high expectations of the possibilities of speech and lip-reading for the deaf, regard such limitations as have been indicated as tantamount to a confession of failure, and attempt to discredit the oral method altogether. But such detractors ignore the conditions imposed by the *loss of hearing*, and the element of uncertainty and imperfection which must inevitably attend the use by the *deaf* of means the perfection of which chiefly depends on *hearing*. The results of the oral method, such as they are, meet the *minimum* requirements of practical life, and may go beyond them, and are quite adequate enough to justify the labour expended It must, besides, not be forgotten that the claim of the deaf to oral instruction does not rest only on its merely utilitarian ends, which are secondary, but even more on the *superiority of speech as an educational agent*. In a more personal aspect, the simple fact that they can be and are orally educated, places them at one bound within the great human family which has in speech one of its strongest bonds of union and marks of superiority, and helps to break down the prejudice and even aversion with which they are sometimes regarded. The oral deaf who are really ambitious to make the most of their speech and lip-reading, will retain them through life, and this is the more easily done if they refrain from associating with other deaf people as a class, for nothing has a more detrimental effect than their constantly and regularly associating together, although on special occasions it may be unavoidable and even desirable. Owing to the imperfections of lip-reading as a means of communication, the use of the manual alphabet, although inexpedient in an oral school, cannot be regarded as superfluous for the adult oral deaf; indeed, they should be free to employ whatever means circumstances may render necessary, without being charged with disloyalty to their training.

As a result of these observations the oral teacher should direct his efforts in this order:

1. To secure a clear, natural, and intelligible articulation. This is of the first importance, whatever else is done.
2. To secure a correct and free use of language as commonly employed in actual life, and so increase the conversational powers of his pupils.
3. To secure as high a degree of proficiency in lip-reading as possible.
4. To constantly conversing orally with his pupils and bringing them into contact with hearing people under all circumstances as early and as frequently as possible, so as to get accustomed to them and gain confidence in themselves. This last is perhaps hardly possible in institutions, but it is good advice for those more favourably circumstanced.

Statistical Estimates. Although, as already stated, it is practically impossible to reduce the variable results of oral education to a satisfactory statistical form, it may be of some interest to notice one or two attempts that have been made in this direction by competent authorities, and incidentally to form some idea of what should be the recognized standard by which the results as a whole are to be judged.

Mr. James Howard, head-master of the Yorkshire Institution, in 1879 instituted an inquiry into the results of oral teaching amongst his pupils after leaving school, followed by others in 1881-88-96, special notice of which was taken by the Royal Commission. The facts disclosed showed that although there was a general shyness of speaking to strangers, the results were on the whole fairly satisfactory from the point of view of the parents and friends of the oral deaf, and Mr. Howard believed they would be more so if more encouragement were given to the deaf than was often the case.

Dr. E. M. Gallaudet, in a paper on "What is speech worth to the deaf?" read before the Paris Congress of 1900, deals with the subject from a higher standpoint. He makes the interesting statement that, in 1867, Moritz Hill, the famous German oral master, expressed to him the opinion "that out of 100 [orally taught] pupils, 85 are capable, when leaving the school, of conversing on commonplace subjects with their teachers, family and intimate friends; 62 can do so easily, while 11 can converse readily with strangers on ordinary subjects. Many others learn to do this after quitting school." This leaves 15 as practical failures, and 74 per cent. as including those who stand for the *average successes* of the oral method. Before coming to Dr. Gallaudet's own estimate, it is necessary to say in advance that, although favourable to speech for the deaf to the utmost extent, his attitude towards the oral method *qua* method has always been and is critical rather than sympathetic. Dr. Gallaudet first lays down, as his criterion, that "when a deaf person can within a reasonable period of school life acquire a power of speech and lip-reading that will enable him or her to converse readily with *strangers* in social life, in business, and in travel, the acquisition is undoubtedly worth all it has cost." With a standard of proficiency so superlative as to place the deaf on all but an equality with the hearing, it is hardly surprising that he finds that to the average oral deaf, *i.e.*, those included in Hill's 74 per cent., "the practical value of speech is small," and he concludes that "for 22 per cent. (*i.e.*, Hill's 11 plus the others who reach the same standard after school) speech is worth what it costs; for 15 per cent. it is of no use, and for the remainder its value is by no means so great" as has been commonly supposed, while "for at least 50 per cent., so far as attempts to teach speech are concerned, 'the game is not worth the candle.'"

If Dr. Gallaudet's criterion be accepted, his estimate must admittedly be regarded as not very wide of the mark, but it is doubtful whether the criterion adopted is a legitimate one or should be the sole test. In our view it is neither, and it would be juster and fairer to take the largest measure of the *average success* of oral results as the criterion, and to take Dr. Gallaudet's 22 per cent. as representing the superlative results. In fact, this would appear to have been Hill's own view, if his words quoted are carefully considered in their true bearing. To condemn, as Dr. Gallaudet does, the average social results of oral education because they do not rise above the "deadly level of the commonplace" is in reality to take too narrow a view of the aims of the method as actually realized in practice, and to ignore the fact that, judged by his own standard, the opposite or any other system is an even greater failure. Nor does he take any account of what is a very important factor—the educational value of speech. Even apart from this, on the principle of half a loaf being better than none, no effort that enables the deaf to converse orally, however imperfectly, with their own circle—to go no further—is wholly wasted. To sum up in a rough way, if we accept Hill's criterion and take his estimate as a basis, and accept Dr. Gallaudet's criterion as to 22 per cent., we prefer to state the social results of the oral method as follows:—22 per cent., superlatively good results; 63 per cent., average results, which within certain limits may vary greatly; 15 per cent., comparative failures.

CHAPTER III.—PREPARATORY EDUCATION.

The Commencement of Regular Education. With the general question of preparatory education that of the proper time to begin the regular education of the deaf by any method is bound up. This question is one on which great diversity of opinion prevails. In regard to the oral method Arnold, in one of his pamphlets, claims that by its employment at an early age the dormant nervous and muscular energy of the organs of speech of the deaf would be roused, and a higher mental development ensue as a result of the cerebral stimulus induced than would otherwise be obtained. The argument is a perfectly valid one as far as it goes, and was doubtless suggested by the experience of hearing children, but the two cases are not exactly parallel, for the latter have the double advantage of having their first attempts at articulation under the controlling guidance of the ear and continuously associated with sufficient language to give them a purpose. Such natural conditions hardly exist for the deaf in infancy. We have seen that one of the cardinal principles of the oral method is the close association of speech with language from the first, and it follows from this that no attempt to teach articulation should be made before it can be used for the simplest linguistic purposes. On this point Dr. Elliott, the experienced head of the London and Margate Institutions, says, "Shall we complete the articulation course before we put it to practical use? I was formerly in favour of this, but further experience has inclined me to think it desirable to use a spoken word—not necessarily every word—as soon as it can be uttered and understood."

The question then must be answered by the further one, How soon can oral language be learned and practically used by the deaf? and the answer to this depends largely on their individual capacity and circumstances. Looking at this question in a more general way, Dr. Elliott proceeds:—

> "I have mentioned the age of six or seven as a generally desirable age for the commencement of oral instruction with completely deaf pupils. This is, I know, later than many recommend. But I have come to this conclusion from the number of early imperfectly taught pupils I have had whose articulation, even after long continued and strenuous efforts to improve it, remained unintelligible. This, I believe, arose from inability to assimilate and put in practice the instruction given at the tender age at which it was commenced, leading to defects in the utterance of all or many important sounds which constant reiteration established so firmly as to defy correction. My view is that the proper place for a deaf child, before he can with advantage commence special instruction, is in the admirable infants' schools of hearing children, acquiring habits of obedience and order, and doing the various kindergarten occupations which are there followed so far as it is able."—*Transactions of Union of Pure Oral Teachers, No. 3 (1899).*

To this may be added the fact observed by experienced oral teachers that a falling off in speech frequently occurs about the middle of the school course, as a result of too early instruction in articulation, without adequate language to support it. The true solution of the question appears to lie in maintaining some balance between articulation and language, with vocal gymnastics as a preparation for the former and writing—but not too early—as an aid in acquiring the latter. It is thus hardly possible to draw any clear line between the preparatory and the regular education, but in general the latter should certainly be begun after rather than before the completion of the fifth year.

Preparatory Education. As the regular education of the deaf under the ordinary conditions of admission to the schools seldom begins before the sixth or seventh year, any suggestions in reference to a course of preparatory education, however necessary, must appear to be more or less a "counsel of perfection." We have seen the detrimental effects of deafness in producing a state of mental vacuity, with nothing to regulate the vagrant wanderings of the child's mind, and so increasing the difficulties of beginning his education. But it is doubtful whether in the end much is really lost by allowing his mind to remain fallow for a time, provided he is kept fully occupied with the ordinary pursuits and amusements of childhood, and is not left to mope by himself or pine away in unmerited neglect. Nor is it advisable for him to be taken away too early from home influences if they are of a healthy character.

At the same time something can be done to direct and regulate the deaf child's mental and physical activities so as to subserve the purpose of preparing him for the conditions requisite to a successful inception of ordinary instruction. The methods of the *kindergarten* supply much that can be borrowed and adapted to the special requirements of the deaf in awakening their minds, training the senses, and teaching the elements of knowledge. But care has to be exercised that it does not degenerate into a mechanical drill and so defeat its own ends. The objects of the kindergarten will be best secured by uniting instruction with enjoyment. For those able to have one, a specially trained nursery governess will be found a great acquisition.

Some of the chief features of a judicious course of preparatory education may be mentioned here. The three great essentials of education, *attention*, *observation*, and *imitation* are usually very defective in the deaf, and it is to their proper cultivation, especially the first, that the teacher's preparatory efforts should be devoted. They are mental efforts so directed and controlled by the will, that sense-experience is made a subject of thought and reflection, or directed to some definite end. The education of the senses is thus the foundation of mental education and rational judgment.

The training of the senses may be best carried out by a course of *muscular*, *sense*, *breath* and *voice* gymnastics.

Muscular Gymnastics. These are provided (1) in the ordinary play and games of children, both in and outdoor; (2) in regulated exercises in standing, running, jumping, walking, and marching with all their associated movements of head, arms, hands and feet so arranged as to cultivate quickness of attention and imitation in following the teacher; (3) in practising the hands and fingers in the various movements of opening, closing, turning, etc., proper to them; (4) in the regulating and directing of all kinds of bodily movements so as to secure due mental control over them.

Sense Gymnastics. *Sight.* The quick and correct use of sight will be best promoted by exercising it in the discrimination of the form, size, colour, motion and distance of objects. For this purpose attention should be directed to striking things, such as animals with all their actions, etc., comparing them with pictures, and encouraging the child to make drawings, however rude, of them. The toys of children, such as coloured construction blocks and pieces, provide excellent means of training sight to the same end.

Touch. The deaf should be made acquainted with the nature of sonorous vibrations by being made to feel them on the teacher's throat when the latter is speaking, and by placing his hand on the piano and on any kind of substance that is a good conductor of sound.

An instructive exercise in the proper function of touch is having on a table various objects, such as cups, toys, balls and other things varying in form and size. Then the scholar being blindfolded, should have one of these put into his hands and felt all over, so as to form clear tactile perceptions of it, next it should be replaced with the others and then found out by feeling only. Those that differ most should be first selected, and afterwards, as the sense became more discriminating, the less different, and so on till all were distinguished. By the same means the relations of touch to sight might be exhibited and strengthened by making the one sense confirm the decisions of the other. Touch is also trained by means of exercises in the discrimination by the hand of the weight of all sorts of suitable objects, especially coins and weights, due regard being had to differences arising from the varying proportions of size and material. The same kind of exercises can also be so employed as to train the faculty of observation ; in fact they can be extended as the teacher's ingenuity may suggest to him.

Manual dexterity, which depends on both sight and touch, may be promoted by such toys as, when taken to pieces, can be put together again, by cutting and arranging pieces of paper or cardboard, and by the quick sorting and classifying of things according to some particular quality, etc. At a much later stage *sloyd* is employed for the same end. The use of the pen may also be acquired by drawing the lines and curves forming the elements of the calligraphic art, but this should not be attempted too early.

It would be well to devise a set of exercises for the lips and tongue, so that they may be made to feel the different qualities of substances, including their sonorous vibrations, and thereby exciting and developing the degree of sensibility necessary for speech.

It will be found that the special exercise of the senses, by increasing the perceptive power of any one of them, prepares it for more facile supplementary service from the central unity of the sensory nerves and the increased mental control acquired.

Breath and Voice Gymnastics. Although some of the physical exercises of children make special demands on the breath, they are not sufficient to regulate its action properly in the future emission of vocal sounds. This must be done independently by inducing the child to make first, quick inspirations and slow expulsions, then full inspirations and rapid expulsions, or slow inspirations and expulsions—the latter not a total exhaustion for it is weakening—next partial inspirations till the lungs are full, and stop or intermittent expulsions. All these differences may be felt and compared on the back of the hand. Another exercise is the use of extemporised paper tubes, by means of which light pieces of paper can be breathed —not blown—away at regulated speeds. By these and such like means the exhaustion observable in the child's first attempts in speech will be avoided.

The use of the voice may be best evoked and cultivated by endeavouring to get the deaf child to produce, in a clear and full manner, the simple sound of *a*, on the fundamental tone, which may be further suggested to him by feeling it on his teacher's throat and chest. Care, however, is necessary that he produces the right sound, as otherwise a defective one may become fixed and determinative. Vocal gymnastics, on the whole, are best left to be included in the course of oral instruction, which in some cases may be begun as early as the sixth or even fifth year.

[REFERENCES. Dr. J. Kerr Love and W. H. Addison, *Deaf-Mutism*, Glasgow, 1896; Hartmann, *Deaf-Mutism*, translated by Cassells, London, 1881; Mygind, *Deaf-Mutism*, London, 1894; Edward Allen Fay, *Marriages of the Deaf in America*, Washington, 1898; Sully, *The Teacher's Handbook of Psychology*, fourth edition, London, 1898 (indispensable, and contains full lists of references to special works); Baldwin, *The Story of the Mind*, London, 1899; Dr. J. G. M'Kendrick and W. Snodgrass, *The Physiology of the Senses* (University Extension Manuals), London, 1898 (indispensable); Bernstein, *The Five Senses of Man*; Warner, *Physical Expression*; Bain, *Education as a Science*; and *Mind and Body*; (all four in the "International Scientific Series," London); Fitch, *Lectures on Teaching*, Cambridge, 1898; Spencer, *Education* (cheap 2/6 edition), London, 1898; Darwin, *Expression of the Emotions*, London; Miss Emily Shirreff, *The Kindergarten*, London; *American Annals of the Deaf* (particularly the articles on the sign-language by M. de Haerne in Vols. XX. & XXI.)]

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Book III.

THE ORAL SYSTEM.

CHAPTER I.—SOUND.

Phonetics. Although speech is closely associated with language from the first in the oral method, it is at the same time a distinct branch of education depending on a knowledge of the mechanical means by which vocal sounds are produced. This is obtained by the study of *phonetics*, defined by one of its leading exponents, A. J. Ellis, as "the science and art of the production of sounds, including cries, by means of the organs of speech in man." He divides this extensive subject into three parts—anatomical, physiological and acoustical.

Anatomical phonetics is "the accurate description of all the organs employed, emissive (lungs, with the muscles acting on them, trachea, larynx, pharynx, mouth and its parts, nose and its passages, with its closing valve the uvula) and receptive (the ear, external and internal, and parts of the brain with which the auditory nerve communicates)."

Physiological phonetics is "the co-ordinated action of the parts just referred to in hearing and uttering sounds, and especially expiration and inspiration, with laryngeal, oral and nasal actions, and the relation of these actions to the will."

Acoustical phonetics, briefly, is the investigation of the laws and properties of sound with special reference to the different modes of its production in music, the human voice, etc., and may be subdivided into two parts, musical and rhetorical, the latter dealing with the mechanism of speech as distinct from singing.

A practical knowledge of phonetics as thus defined is a necessity for every oral teacher, particularly the first two parts of it. We shall take the third, that of sound, first, without however attempting more than to explain so much of the subject as concerns us, leaving the reader to special works for fuller details.

Sound. Sound as a physical phenomenon is usually defined as *vibration appreciable to the ear.* Such vibration takes the form of an undulatory motion set up in the particles of the air, sonorous bodies and other media as light waves are in the æther, and its velocity in air at 60° Fahr. has been estimated at 1,120 feet per second.

Musical sound is due to a rapid periodic motion of the sonorous body; noise to non-periodic motions. The difference between the two is, however, not always clearly defined, and a combination of musical tones may produce a noise.

Musical tones are either *simple* or *compound.* A simple tone is an impression produced by a simple or pendular vibration of the air, such as that caused by a tuning fork. In practice we seldom hear simple tones, and musical tones are usually compound, *i.e.,* they are an impression produced by the simultaneous action of several simple tones with certain definite ratios of pitch. These are called *constituents* or *partial tones*, and the first of them is the *fundamental*, or *prime partial tone* of the compound, and the rest its *harmonic upper partial tones.* When a string is vibrated in all its length between its two nodes, the resulting note is fundamental. Each constituent is capable of exciting a sensation of a simple tone if it be singled out and re-inforced by a resonator, but this is less easy with the human voice than stringed instruments.

Musical tones give rise to certain sensations, which are distinguished as those of intensity, pitch and quality.

Intensity is the force or loudness of a sound, and is measured by the amplitude of the vibrations, or in other words, the height of the waves. Its chief properties are:—

1. It varies inversely as the square of distance, but
2. Directly as the square of amplitude of vibrations.
3. It increases with density of medium.

4. It is modified by motion of the atmosphere.
5. It is strengthened by proximity of sonorous bodies.

Pitch is the rate of vibration, and is measured by the number of vibrations in a given time, or otherwise expressed, since the wave-length is shorter in direct proportion to the rapidity of the recurrence, the pitch depends upon the length of the waves which go to produce the sound. Sounds may vary in pitch while of the same intensity. The pitch of sounds is broadly described as acute, shrill, high, sharp, grave, deep, low, flat.

Quality, sometimes called *timbre* or *klang*, is the peculiarity of impression by which we distinguish the musical tone of, say the violin from that of the flute, or that of the human voice, when they all produce the same note at the same pitch. This is due to the fact that such sounds are not simple tones, but sounds in which a series of simple tones are so blended so as to give a single sound with a special quality by which we can recognize the kind of instrument that has produced it. According to Helmholtz, these differences in tone depend on the co-existence with the principal, fundamental, or prime, of other secondary and affiliated vibrations which accompany and modify the sensation by alterations which they produce upon the form of the vibration or sound-wave itself. These secondary waves, when occuring in the same period as the primary, are termed *harmonics*, *overtones*, or *upper partial tones*, and the sensation of "quality" is chiefly due to their number and relative strength. They are usually less intense than the prime, which alone determines the pitch. The quality of a sound may almost be termed its acoustic colour.

The Human Voice. By the best authorities the voice is regarded as being analogous to a reed pipe, the vocal cords forming the reed and the cavity of the mouth the pipe or resonator. Hence, as a musical instrument, it is classed with wind instruments. It is rich in harmonics, as many as sixteen having been detected in a bass voice. It is by the action of membraneous elastic tongues called the vocal cords that the vibration of the voice is produced and its musical note determined, it being the function of the oral cavity or mouth, with the tongue, etc., to so modify the issuing voice as to form the speech-sounds.

The varying notes of the human voice are due to differences in the length and diameter of the vocal tube, and depend on the principle that the pitch of sounds produced by any two tubes is in the inverse ratio of their length and diameter. Hence the male voice is deeper than the female and the child's sharper than either. The range of the human voice is about three octaves (from f_4 to sol_4).

The appliances of the organs of speech resemble in some respects certain musical instruments, such as the flute and violin, for when the pitch is raised the vocal cords are drawn closer, the larynx raised, the tongue placed nearer to the palate, and the pharynx contracted; thus the tube is shortened and narrowed, and the orifice of the mouth contracted in the utterance of the higher sounds.

In singing without words the action differs, for as the object is to utter musical sounds only, the larynx acts independently and rises or falls as required by the tension of the vocal cords. But when words are associated with the music, then all the organs take part, but in subjection to the demands of the music, which may ascend a couple of octaves at a single glide. Learning to sing the notes may be helpful to our scholars in improving the voice, but it is not the form which nature has provided in speech, for the end is different.

Here the chief function of sound is to express thought, and for this purpose the scale of the vowel sounds is more limited; and the consonants with which they are associated being of a less variable character as sounds, there is less room for vocal variations. Some speakers confine themselves to a scale of a very few notes, whilst others use a more extended one, but beyond a certain point any indulgence in lower or higher notes is called singing.

Stone states that "the vowel sounds of the human voice are marked by comparatively low partials, those of *E* and *I* alone somewhat exceeding the limits of the forks used [in Helmholtz's experiments]. *U*, *O*, the modified German *Ö* and even *A* can be more or less imitated. By further additions to the series of forks *E* and indeed all but *I* were produced.

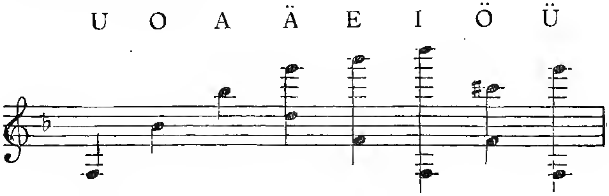
. . . . The vowels are arranged by Helmholtz, after Du Bois Reymond, in this series—

(1) The broad *A* in *father* is the common origin of all, the cavity of the mouth being funnel-shaped, with uniform enlargement outwards. A lower series consists of *O*, as in *more*, and *U*, as in *poor*, in which the lips are contracted and the tongue depressed so as to form a bottle-shaped cavity.

(2) In the vowels *A*, *E*, *I*, and the modified German *Ä*, the lips are drawn far apart, and a contraction is made between the middle of the tongue and the hard palate. These have a higher and deeper resonance tone.

(3) In the third series from *A* through *O* and *U*, in addition to the contraction of the tongue and palate, we have also a contraction of the lips into a sort of tube like that of a bottle with a very long neck.

The resonance of the cavity of the mouth for vowels may be thus expressed in musical notes." (The diacritic marks are Stone's):—



Or, as expressed by another writer:—

OU	O	A	AI	E	I	EU	U
fa$_2$	si♭$_3$	si♭$_4$	sol$_5$	si♭$_5$	re$_6$	do$_5$	sol$_5$.
			or	or	or	or	or
			re$_4$	fa$_3$	fa$_2$	fa$_3$	fa$_2$.

The prime and upper partials which in the human voice form a musical note, proceed in a regular arithmetical progression.

Helmholtz, in his classical *Sensations of Tone*, thus explains the production of the vowel sounds on the principle of resonance, "they are in reality tones produced by the vocal cords, with a resonance chamber (the mouth) capable of altering in length, width, and resonant pitch, and hence capable of reinforcing [by the air in the oral cavity and its prolongation towards the larynx] at different times different partials of the compound tone to which it is applied." Quality of voice, therefore, depends not merely on the size, degree of elasticity, and general mobility of the vocal cords, but also on the modification, by the form of the resonating cavities above, of the original quality of tone generated by the cords, thus giving a character to vowel tones—indeed to such an extent that each may be said to have a fixed pitch.

Although, as has been observed, deafness is rarely absolute in the deaf, the degree of hearing possessed by them does not enable them to do more than judge of the intensity of their own voices, while of pitch they have little or no idea, and of quality certainly none. it is probably to the want of perception of these last two sensations that the somewhat mechanical character of the speech of the oral deaf may be attributed, and which, however accurate the articulation, renders it not invariably intelligible to strangers. This experience of the deaf is to some extent analogous to that of the born blind, who have an idea of the form, size, weight, etc., of an object but not of its colours.

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CHAPTER II.—ANATOMICAL PHONETICS.

SECTION I.—THE ORGANS OF RESPIRATION.*

(Sections I. and II. revised by Arthur H. Jones, M.D., M.R.C.P.)

Voice and speech as forms of action are produced by the modification of air received from without into the lungs and propelled thence (or expired) by muscular force excited spontaneously. The lungs are, therefore, the bellows which supply the air, and two things are required of them for the efficient performance of their function—capacity to contain a sufficient supply, and force equal to its regulated expulsion and inspiration. Or expressed as a rule—the capacity and power of the lungs ought to be equal to all the demands of respiration. Now it is found that the absence of speech leads to an imperfect development of the lungs, both in capacity and power, because the muscular action that speech would have occasioned is never brought into use, and like any other active member of the body when unemployed they become smaller and weaker and finally rigid. This is the condition in which the lungs of deaf-mutes are found. Artificial means must therefore be applied to develop the muscles more intimately connected with respiration and speech. Their close connection with the lungs leads at the same time to their development and the consequent promotion of health and physical vigour.

Muscles, Ligaments and Tendons "*Voluntary muscle* is composed of long cylindrical fibres, measuring on an average about $\frac{1}{500}$ of an inch in diameter in mammalian muscles, but having the length of an inch or more. Each fibre has an elastic sheath, the *sarcolemma*, which encloses the contractile substance."

"They compose the substance known by the name of red flesh, and a good idea may be formed of them by examining the red flesh of quadrupeds. Their characteristic property is contractility, and there is neither action nor repose in the position of any of our limbs without muscular contraction. For every moveable point in the animal frame is constantly situated between two muscular powers opposed to each other ; between those of flexion and extension, of elevation and depression, of adduction and abduction, etc. ; this opposition is a condition essential to motion, for in whatever direction the limb is moved the moveable point must necessarily be in the opposed direction, the act of flexion requiring it should be first extended, and *vice versa.*"

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* In correcting this and the next Section only such alterations have been made as were necessary to give a correct description of the muscles and other structures and their functions. Arnold's own ideas of them have been left to Mr. Farrar to revise, except where anatomical correctness was concerned.—A. H. J.

"The nerves which are connected with the brain and used by its determining power, call the muscles into action ; and for this they pierce the sarcolemma and terminate in a ramified expansion as an end plate."*

These muscles are, therefore, under the power of the will, and can be freely exercised for their own development and the functions they have to discharge.

"*Involuntary* or *plain muscular tissue* is composed of long, somewhat flattened cells, which vary much in length but are at least $\frac{1}{600}$ of an inch long. Each cell has an oval or rod-shaped nucleus, which shows the usual intra-nuclear network, and commonly one or two nucleoli."

Though these involuntary muscles are not directly dependent on volition in their action, they are indirectly affected, and become strong or weak with the healthy or diseased state of the voluntary muscles.

"*Cartilage* or *gristle* is a translucent bluish-white tissue, firm, but at the same time elastic, and for the most part found in connection with bones of the skeleton, most of which, in the embryo state are at first represented entirely by cartilage." It consists of two kinds. In one, the *hyaline*, "the matrix, or ground substance, is clear and free from obvious fibres ; in the other, called *fibro-cartilage*, the matrix is everywhere pervaded by connective tissue-fibres." When these are of the white variety, the tissue is white fibro-cartilage; when they are elastic fibres, it is yellow or elastic cartilage. Hyaline cartilage is found in two situations, (1) covering the ends of the bones in the joints, where it is known as articular cartilage; and (2) forming the rib-cartilages, where it is known as costal cartilage. "It forms also the cartilages of the nose, the external auditory meatus, the larynx (except the epiglottis and cornicula above the arytenoids), and the wind-pipe; in these places it serves to maintain the patency of the orifices and tubes." Elastic or yellow cartilage occurs in the ear, epiglottis, and Eustachian tube.

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* The references in the original edition are insufficient for these and other quotations to be traced and verified.—A. F.

Ligaments may be described as an assemblage of strong fibres connecting the bones together at the joints, and giving that security which will prevent displacement, and yet such a latitude of motion as will admit of the easy movement of one bone on the other.

Tendons, as distinguished from ligaments, unite muscles with bones and other structures.

The Trachea. The trachea or wind-pipe is a fibrous and muscular tube, the wall of which is rendered somewhat rigid by C-shaped hoops of cartilage (Fig. 1, *t*), which are imbedded in the fibrous tissue. The muscular tissue, which is of the plain variety, is mostly disposed as a flat band, the fibres of which run transversely at the back of the tube. The trachea is lined by a mucous membrane, which has a ciliated epithelium upon its inner surface, by the vibratory action of which the mucus is urged upwards.

The two divisions of the trachea, the *bronchi* (Fig. 1, *r*, *l*), are precisely similar in structure. And the larynx is also very like the trachea, so far as the structure of the mucous membrane is concerned, but over the true vocal cords and upon the epiglottis (Fig. 13, *e*), as well as upwards from just above the false cords, stratified epithelium occurs.

The bronchial tubes at first consist of two main branches (Fig. 1, *r*, *l*), afterwards they ramify still more and finally terminate in air cells.

The Lungs. The lungs (Fig. 2, *g*) are formed of an infinite number of these cells, separated from one another by a thin tissue filled with blood vessels. They are charged and emptied of air by the alternate expansion and contraction of the chest walls. In expansion, or inspiration, the external air is drawn in through the windpipe and bronchial tubes ; and by contraction, or expiration, the air is driven out by the same route. In a healthy state this double movement is made with great regularity, at the rate of eighteen respirations per minute in adults, which gives 3⅓ seconds to a complete respiratory cycle. The second movement is a little longer than the first and it is followed by a short pause. The voice is affected by these movements, and therefore to secure a full, clear voice, the respirations should be made when the lungs are free from all excitement or undue exercise. The quantity of air contained in the lungs varies much in different persons, owing to the variation of the capacity of the lungs.

The lungs are contained and protected by a strong cage formed of the ribs (Fig. 3), twelve in number, which are articulated behind with the corresponding vertebræ, and in front most of them are united by means of cartilages with the broad, flat breast bone, called the *sternum* (Fig. 3, *a*). Five of the ribs are united to the sternum by five separate cartilages, the sixth to the ninth have one common cartilage, and the three lowest have their anterior ends free. This cage is much smaller at the top than at the bottom. It is evident from the diagram that the posterior articulations of the ribs are higher than the anterior (Fig. 3), and permit a double movement, of elevation and depression, which increases or lessens the capacity of the chest. Below, the diaphragm, like a veil, separates the chest from the abdomen (Fig. 6), and participates in the muscular action of respiration. The surface of the lungs is in close apposition to the chest wall, and though not united with it by tissue, in the absence of communication of the (potential) space between them and the external air, that apposition is constantly maintained by the pressure of the air entering the bronchial tubes and air cells.

The result is that the lungs closely follow the ribs and the sternum in all their movements of elevation and depression—or expansion and contraction—which render the entrance and exit of the air, the double function of respiration, possible and facile.

The Motor Organs. As the sternum and ribs are by themselves inert, the motor organs come to their aid. These are the *inspiratory* and *expiratory muscles*, which play the part of the hand, when placed on the upper part of a pair of bellows, in alternately raising and depressing it, by the introduction and expulsion of air. A brief description of the muscles which take part in this action is here given, in order to deduce from their functions the attitudes and exercises most favourable to respiration.

Their attachments and functions with the attitudes which favour or retard these functions will be stated.

INSPIRATORY MUSCLES. The *principal* inspiratory muscles are :—1. Diaphragm (Fig. 6) ; 2. Intercostales (Fig. 4, *h*) ; 3. Levatores costarum.

The *minor* are :—4. Scalene muscles ; 5. Serratus posticus superior (Fig. 5, *s*).

The *accessory* muscles of inspiration, viz., those which give purchase for the muscles of ordinary inspiration, by fixing otherwise moveable parts :— 6. Erectores spinæ, and other muscles of the back (Fig. 5, *j*, *k*, *l*) ; 7. Serratus posticus inferior (Fig. 5, 11) ; 8. Quadratus lumborum.

The muscles of *forced* inspiration are :—9. Pectoralis major (Fig. 4, 7) ; 10. Pectoralis minor (Fig. 4, *l*) ; 11. Sterno-mastoid ; 12. Serratus magnus (Fig. 4, *g*) ; 13. Latissimus dorsi (Fig. 5, *d*) ; 14. Trapezius (Fig. 5, *a*) ; 15. Deltoids (Fig. 5, *b*).

1. The *diaphragm* or *midribb* (Fig. 6) is a broad muscular expansion which separates the chest from the abdomen. Its form is nearly circular, its upper convex side is turned towards the chest and lower concave surface towards the abdomen. It is fleshy at

its circumference, and tendinous in the centre (Fig. 6, *a*, *b*, *c*). In front it is attached to the *ensiform* cartilage (Fig. 3, *e*), laterally to the inner surface of the last six ribs, posteriorly, by its left pillar (Fig. 6, *o*) to the bodies of the first three, and by its right pillar (Fig. 6, *n*) to the first four lumbar vertebræ. Its upper surface is connected with the *pericardium*, the *mediastinum* (the space between the lungs), and the *pleura*; it supports the heart and the base of the lungs (Fig. 2, *f*). In nearly its whole extent it is covered below by the *peritoneum.*

Its functions in respiration are most important. Every time we draw our breath it contracts, and reduces its vaulted form to a plane. This enlarges the capacity of the chest so as to admit of the greater expansion of the lungs. In forced expiration the abdominal muscles press the viscera upwards, and the diaphragm ascends into the thorax, compressing the lungs at the same time. It also assists in many other functions, as coughing, laughing, hic-cough, and the expulsion of the contents of the intestines.

The attitude which is most favourable to the inspiratory action of the diaphragm is the vertical posture, because it permits the greatest depression of the abdominal viscera. On the contrary, a sitting posture is less favourable.

Large inspirations give more life to the body and also seem to stimulate mental life. He who speaks standing has greater facility and influence than one who speaks seated. To bend the body forwards hinders the action of the diaphragm.

Filling the stomach impedes respiration, for it prevents the depression of the diaphragm ; and the same effect is produced by bending the thighs in a sitting posture. When the arms are crossed on the chest or the hands joined behind the back, inspiration is impeded by limiting the upward movement of the ribs.

It is evident that all the attitudes which are favourable or adverse to respiration produce similar effects on the voice in speaking or singing, and that the healthy use and development of the lungs in capacity and power must increase the resources for sustained and vigorous vocalization.

2. *Intercostales* (Fig. 4, *h*) (muscles between the ribs).* Extending from the lower margin of each rib to the upper margin of the rib below are two muscular layers. The outer has its fibres running downwards and forwards, but in the inner layer the fibres run downwards and backwards. By the contraction of the external fibres and a few others the ribs are drawn together, the cavity of the thorax is increased, and inspiration is effected.

3. *Levatores costarum* (elevators of the ribs). These are twelve small muscles in the back on each side. They take their purchase above from the transverse processes of the last vertebra of the neck, and the eleven highest vertebræ of the back, and are inserted into the portion of the rib immediately below. By raising the ribs they enlarge the chest and so produce inspiration.

4. *Scalene muscles.* A group of strong muscular columns, usually three in number. (*a*). *Scalenus anticus*, is attached superiorly to the anterior tubercles of the transverse processes of the third to the sixth cervical vertebræ, inferiorly to the surface of the first rib. (*b*). *S. medius*, is attached above to the transverse processes of the last six cervical vertebræ, below to the first rib. (*c*). *S. posticus*, attached above to several of the lower cervical vertebræ, and below to the second rib.

They have a slight action of expanding the chest by raising the upper ribs.

5. *Serratus posticus superior* (Fig. 5, *s*) is a thin flat muscle. Its upper attachment is chiefly to the spines of the last cervical, and two or three upper dorsal vertebræ. The lower attachment is to the second, third, fourth, and fifth ribs, a little beyond their angles.

Its function is to elevate the upper ribs, and it is therefore a muscle of inspiration.

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* Names given thus within brackets are not recognized names but translations or descriptions of the technical names.

6. *Erectores spinæ* (the straighteners of the spine) (Fig. 5, *j*, *k*, *l*.) Extending from the pelvis (or girdle, including the two hip bones) below, are groups of longitudinal muscles inserted into the vertebræ and ribs above in very complicated series. These groups, however, simply form muscular bundles which by their combined contraction keep the spinal column in the erect position, and sufficiently rigid to enable the muscles of inspiration to act with due effect. If ill developed, inspiration is necessarily feeble. Hence the evil of stooping. They may be developed by exercises which arch the spine backward or which set the pupil to raise the shoulders from the couch when in the prone position, without the assistance of the arms.

7. *Serratus posticus inferior* (Fig. 5, 11). The lower attachment is to the spines of the lower two dorsal and upper two or three lumbar vertebræ, passing outwards, upwards and forwards. It is attached by four fleshy digitations to the lower borders of the last four ribs.

Its function is to draw the lower ribs downwards and more backwards, and therefore it is a muscle of expiration, but by fixing the lower ribs it can contribute to the inspiratory action of the diaphragm.

8. *Quadratus lumborum* (square muscle of the loins). This extends from the crest of the hip bone below, to the last rib, and forms the wall of the abdomen in the loins. By the combined action of the muscles of the two sides, the spine is kept straight, and the last ribs are fixed for the action of the diaphragm.

9. *Pectoralis major* (great pectoral) (Fig. 4, 7). It is attached *(a)* to the inner half of the clavicle; *(b)* to the front of the sternum; *(c)* to the cartilages of the first six ribs, and a little to the bony portion of the sixth rib; *(d)* and lastly from an aponeurosis or tendinous expansion of the external oblique muscle of the abdomen.

The function of this powerful muscle is to move the arm forwards and downwards, as in striking a blow. When the arms are raised and fixed the muscle becomes an inspirator by elevating the ribs.

The exercises favourable to inspiration are :—elevating the arms, the gymnastic exercises on the trapeze, on smooth and knotted ropes, oscillating poles, the orthopædic and horizontal ladders, the suspension bar and rings.

10. *Pectoralis minor* (small pectoral) (Fig. 4, *l*). This is underneath the preceding. Above, it is attached by a strong, flat tendon to the coracoid process of the scapula (shoulder-blade) (Fig. 4, *x*) ; below, to the third, fourth, and fifth ribs. In action it draws the shoulder bone forwards and downwards, but when this is fixed it elevates the ribs.

From its action on the ribs in elevating them it is an efficient inspirator. It is exercised by movements which depress the shoulder, and the most favourable attitude for its inspiratory effect is when the shoulders are elevated and the arms fixed.

11. The *Sterno-mastoid* is attached above to the mastoid process or great tubercle of the skull behind the ear, and below to the superior part of the sternum and inner end of the clavicle (collar bone).

As to its functions, if the lower end is fixed, it moves the head, but if the head is fixed it elevates the sternum and the inner end of the collar bone, and hence, but only in very forced respiration, becomes an inspirator. Its greatest effect, in this respect, is when the head is erect, and its least when the head is bowed or leaning on the shoulder.

12. The *Serratus magnus* (Fig. 4, *g* ; Fig. 5, 10) is situated on the side of the chest and anteriorly attached to the first eight or nine ribs, and posteriorly, to the whole length of the base of the scapula (Fig. 5, 10).

Its office is to bring the scapula forward ; but when that bone is fixed it probably becomes a muscle of laboured inspiration, for it raises the ribs.

13. *Latissimus dorsi* (broad dorsal). This is a large, thin, flat muscle, situated on the back and side of the lower part of the trunk. Above, it is attached (Fig. 4, *e*) to the inner edge of the groove in the humerus (or arm bone), which receives the long tendon of the biceps ;

below (Fig. 5, *d*), to the posterior half of the external border of the crest of the ilium, and to the back and upper part of the sacrum ; on the inner side it is fixed to the spinous processes of all the lumbar and to those of the six or seven lower dorsal vertebræ ; on the outer side to the last four ribs by as many digitations.

Its functions are to carry the arms backwards and downwards, or when the hand is fixed it brings forward the body. When the arms are elevated the great dorsal is able to draw up the four last ribs and becomes an inspirator. In the climbing position it is an inspirator, while it elevates the body. The gymnastic exercises which set it in motion are climbing the ladder, the oscillating bar, smooth and knotted cords, the trapeze and rings, and swimming or dumb-bell exercises by the backward action of the arms.

14. The *Trapezius* is a broad, flat muscle (Fig. 4, 1 ; Fig. 5, *a*), situated at the posterior part of the shoulder and upper part of the back. Above, it is attached at the superior transverse line of the occipital bone and to the cervical vertebræ ; below, to the spinous processes of all the dorsal vertebræ ; on the outer side to the spine of the scapula, and the edge slides over a triangular space at the extremity of that bone ; to the acromion process (Fig. 5, *c*) ; and to the external third of the clavicle (Fig. 4).

As to its functions, when all the fibres of this muscle act simultaneously, they draw the scapula and clavicle upwards and towards the spine ; the upper fibres will elevate the shoulder, the lower depress it. It also impresses on the head a triple movement of lateral inclination, of neck extension, and of rotation to the opposite side. The two trapezius muscles, by fixing the head, favour the inspiratory action of the sterno-mastoids and the scalenes, and consequently are very indirectly muscles of forced inspiration.

15. The *Deltoids* (elevators of the arms) (Fig. 4, 2 ; Fig. 5, *b*) raise still higher the humeral insertions of the great pectoral and the broad dorsal. Each forms the fleshy part of the shoulder. Above, it is attached to

the external third of the clavicle (Fig. 4, 3); to the acromion process (Fig. 5, *c*), and to the lower edge of the spine of the scapula; below, the fibres unite to a tendon inserted into the deltoid impression in the middle part of the external surface of the humerus.

Their principal office is to raise the arms, but they can also move them backwards and forwards, and therefore favour inspiration. The gymnastic exercises already described are adapted to their development. The contribution of the deltoids to respiration consists in raising the arms and thus placing the limb into position for forced inspiration by means of the pectoral muscles.

EXPIRATORY MUSCLES. Quiet expiration is chiefly performed by the elastic contractility of the lungs, and the return of the ribs and other displaced organs to a position of rest, aided probably by the internal intercostal muscles. When forcible expiration is performed the principal muscles contributing to this function are the *obliqui abdominalis* (externus and internus), the *rectus* and the *transversalis abdominis*. The first or external oblique is situated on the anterior and lateral parts of the abdomen. It is attached above by fleshy triangular slips, called digitations, to the external surface and inferior margin of the last seven or eight ribs; below, to the two anterior thirds of the crest of the ilium or hip-bone, and in front into the broad, fibrous wall of the abdomen (Fig. 4, 6 and 8; Fig. 5, *e*).

The second or internal oblique muscle (Fig. 4, *k*; Fig. 5, 12) is placed underneath the preceding. Above, it is attached to the border of the cartilages of the ninth, tenth, eleventh, and twelfth ribs; below, to the spine of the ilium (Fig. 5, *i*), to the crural arch and the pubes; behind, by means of a broad tendon, to the spinous processes of the lumbar vertebræ and to the sacrum, in front to the linea alba.

The third or *rectus abdominis* (straight abdominal muscle) (Fig. 4, *j*) is situated immediately in front of the abdomen on each side of the *linea alba* (white line) under the anterior laminæ of the tendons of the oblique muscles. Long and flat, it is attached above to the cartilages of the fifth, sixth, and seventh ribs, and to the ensiform cartilage ; below to the pubes.

The fourth or *transversalis abdominis* (transverse abdominal muscle) is situated behind the oblique muscles ; its form is similar, and it is attached above to the cartilages of the lower ribs ; below, to the crest of the ilium, and to the two internal thirds of the crural arch ; behind, to the transverse and spinous processes of the lumbar vertebræ by their common tendon.

The respiratory function of the four pairs of last mentioned muscles is to draw down the thorax and raise the abdominal viscera towards the diaphragm, whose convex or upper side rises towards the chest and diminishes its capacity by expelling the air contained in the lungs. The upright position, by lengthening their attachments, favours their functions ; but, on the other hand, a sitting posture or the bending forwards of the trunk, hinders them. Respiration is also favoured by the extension of the trunk behind.

These different postures have similar effects on articulation, for they give greater tension to the expelled air, and consequently greater force to the organs of speech.

These are the principal organs of respiration. Their action in inspiration and expiration in the human organ is like that of bellows, by elevating and lowering the walls of the thorax as the air is alternately inhaled or expelled in the double function of respiration and articulation. Ordinarily these movements follow with rhythmic alternation. But at times the action is impeded, to the great detriment of the respiratory and vocal functions. This happens frequently with stammerers. Deaf-mutes are not deficient in respect to this rhythmic alternation of the respiratory function, but it is performed with diminished energy, from the absence of the voice. In fact, the production of the voice demands muscular action to provide the tension necessary to the action of the vocal cords, and it must be artificially provided.

Respiratory Exercises. The primary care ought to be to station the learner in the most favourable attitude, which is the erect, directly opposite to the teacher, and to make him execute the inspirations and expirations rhythmically by giving him examples of these movements. We begin with that in which the diaphragm plays the principal part, to make profound abdominal inspirations, and then gradually restore the diaphragm by the inverse action of the abdominal muscles. Then to excite and regulate this function, we place pieces of paper graduated in weight, from the lightest to the heaviest, and lead the scholar to blow them off in succession. Then, when sufficiently exercised in this manner, he is led to execute the most energetic movements of the whole of the muscles, in order to make them flexible and to introduce normal habits by good discipline, in the following manner :—

1. By the action of the deltoid and trapezius muscles we raise the arms aloft, at the same time raising the humeral insertions of the pectorales and of the latissimus dorsi.

2. Care should be taken that the contraction of the diaphragm is executed at the same time as that of the deltoids ; the chest should also be well expanded.

3. Then, by the contraction of the latissimus dorsi, we should quickly throw the arms below and also behind, making the contraction of the abdominal muscles coincide with that of the latissimus. The gymnastic exercises of the rigging and the elementary movements called the soldiers' drill will also aid in these special exercises of respiration.

The great quantity of air introduced to the lungs by these exercises favours hematosis, and in addition to the immediate object sought by them exerts a happy influence on the health.

In the foregoing description of the muscles which have chiefly to do with respiration, their different functions have been sufficiently noted to enable the teacher to select the most appropriate exercises for their development. But this is not enough, the breath itself ought to accompany each of them in vigorous or prolonged inspirations and expirations; so that these muscles and the lungs may interact and thus increase their power and confirm the habits most helpful to free and ample respiration. Those who hear and speak have been unconsciously using their forces since they pronounced their first word, so that their muscles and lungs are highly developed. Deaf-mutes use them only for vital respiration, and their action is therefore limited to its necessities; but speech requires much more in volume, muscular force and facility for its free production. This must at first be produced artificially. Let then respiration be increased by muscular action till every utterance shares in the effect.

* * *

FIGURE 1.

FIG 1.

OUTLINE OF THE LARYNX, TRACHEA, AND BRONCHIAL TUBES, SEEN FROM BEFORE.

(One-third natural size.)

h, hyoid bone; *e*, epiglottis; *s*, superior, and *i*, inferior cornua or horns of the thyroid cartilage; *c*, the cricoid cartilage; *t*, trachea, the unshaded parts being the cartilaginous rings; *r*, *l*, the right and left bronchi respectively.

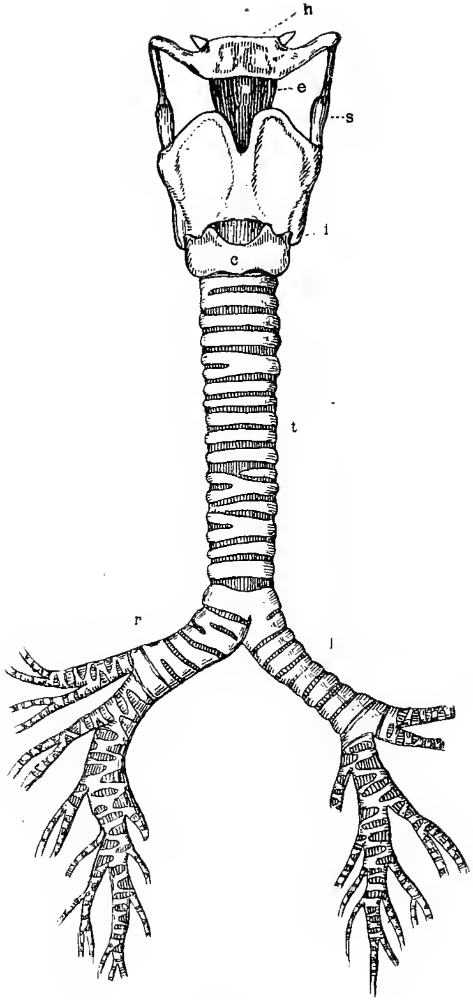

Fig. 1.

FIGURE 2.

FIG. 2.

SEMI-DIAGRAMMATIC VIEW OF THE THORAX.

(One-fourth natural size.)

The lungs have shrunk from the front of the chest. *a*, right clavicle ; *m*, placed on the lower part of the manubrium of the sternum ; *g*, the right lung ; *t*, the heart ; *f*, *f*, the diaphragm, separating the cavity of the thorax from that of the abdomen ; *h*, right, *h'*, left lobe of the liver ; 1-10, placed on the 1st, 2nd, etc., ribs, just beyond the end of the costal cartilages.

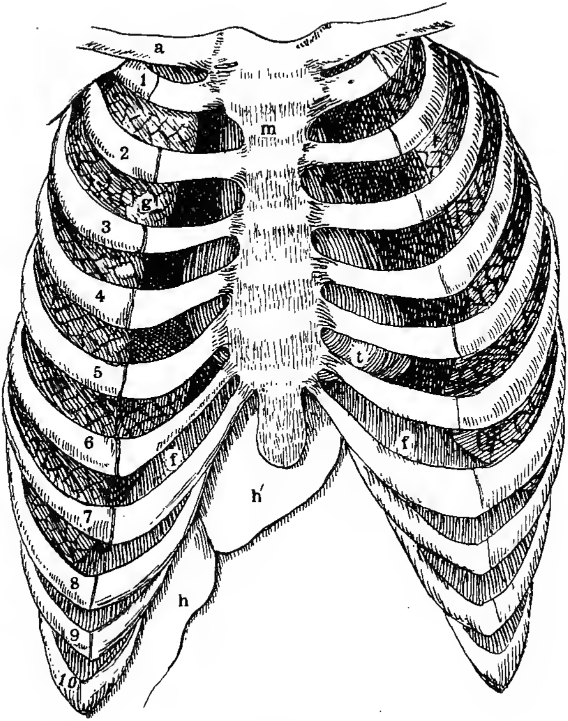

Fig. 2.

FIGURE 3.

FIG. 3.

FRONT VIEW OF THE THORAX, SHOWING THE STERNUM, COSTAL CARTILAGES, RIBS, AND DORSAL VERTEBRÆ

(About one-fourth natural size.)

a, body of sternum ; *b*, first dorsal vertebra ; *c*, placed on the costal cartilage of the 4th rib ; *d*, twelfth dorsal vertebra ; *e*, ensiform process of the sternum ; *f*, *f*, 11th ribs ; *g*, *g*, 12th ribs.

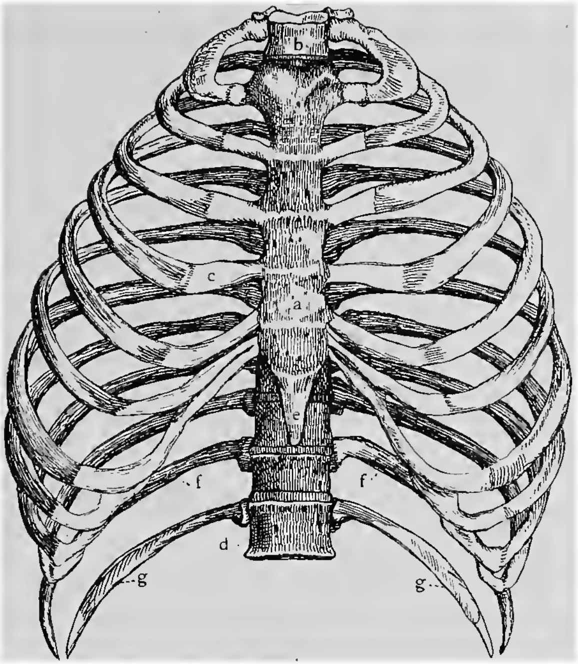

Fig. 3.

FIGURE 4.

FIG. 4.

MUSCLES OF THE CHEST AND ABDOMEN.

(On the right of the body the more superficial, on the left the deeper muscles are seen.)

i, atlas or first cervical vertebra; *a*, levator anguli scapulæ; *b*, sternum; *c*, left clavicle; *d*, tendon of the pectoralis major; *e*, tendon of the latissimus dorsi; *p*, coracoid, and *f*, glenoid head of the biceps cut short; *g*, serratus magnus; *h*, external intercostal; *j*, rectus abdominis; *k*. internal oblique; *l*, pectoralis minor; *m*, sub-scapularis; *n*, coraco-brachialis cut short; *o*, sub-clavius; *x*, coracoid process.

1, trapezius; 2, deltoid; 3, acromion process; 4, biceps; 5, triceps; 6, external oblique; 7, pectoralis major.

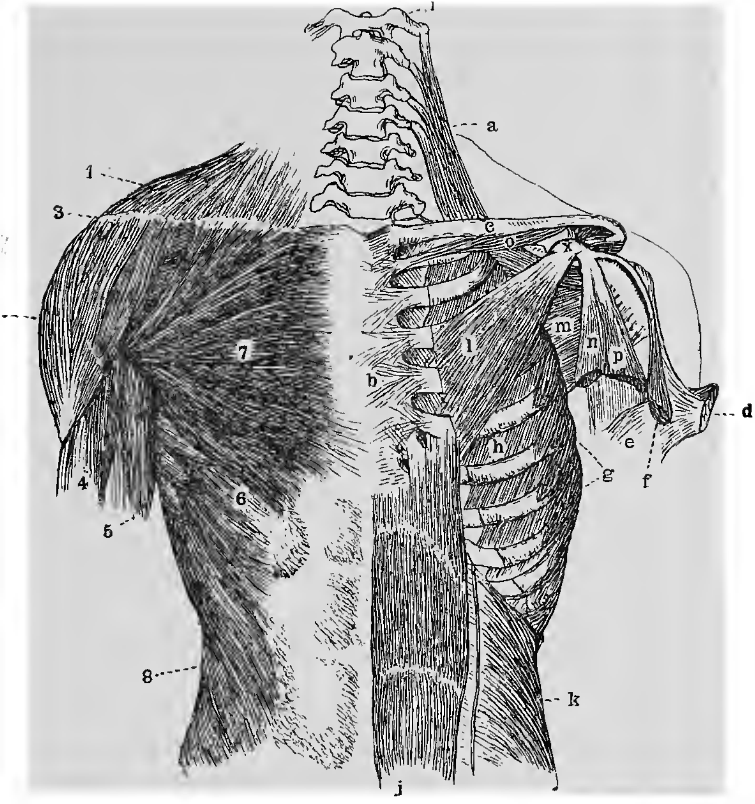

Fig. 4

FIGURE 5.

FIG. 5.

MUSCLES OF THE BACK.

(On the right the more superficial, on the left the deeper muscles are shown.)

a, trapezius extending downwards to the middle of the back; *b*, deltoid; *c*, acromion process; *d*, latissimus dorsi; *e*, external abdominal oblique muscle; *f*, infra-spinatus; *g*, teres major; *h*, teres minor (the part of the muscle on the left of *h* belongs to the infra-spinatus); *i*, crest of the ilium; *j*, part of the spinalis dorsi; *k*, part of the longissimus dorsi; *l*, tendons of the ilio-costalis (*j*, *k*, *l*, are parts of the group called erector spinæ); *m*, lower end of the splenius colli; *s*, placed on the oval tendon between the two trapezius muscles, points to the upper part of the serratus posticus superior (the darker strip).

1, splenius capitis; 2, levator anguli scapulæ; 3, rhomboideus major; 4, rhomboideus minor; 5, infra-spinatus; 6, supra-spinatus; 7, teres major; 8, long head of the triceps; 9, teres minor; 10, serratus magnus; 11, 11, upper and lower portions of the serratus posticus inferior; 12, internal oblique muscle of the abdomen.

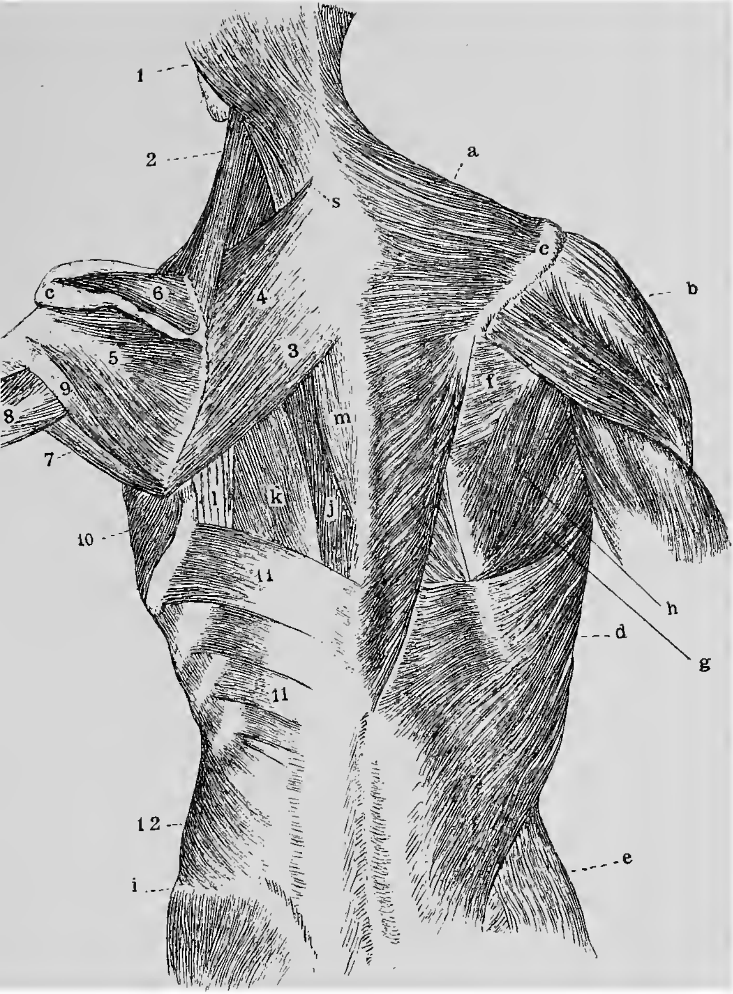

Fig. 5.

FIGURE 6.

FIG. 6.

LOWER SURFACE OF THE DIAPHRAGM, AS SEEN FROM THE FRONT.

Above and on the sides are seen the lower ribs. *a*, *b*, *c*, are placed on the three divisions of the trefoil tendon; *d*, by the œsophagus; *e*, by the aperture for the inferior vena cava; *f*, *f*, eleventh ribs; *h*, *h*, twelfth ribs; *g*, fourth lumbar vertebra; *i*, aorta; *j*, on the right side (left of the figure), attachment of the arched ligament to the transverse process of the first lumbar vertebra; *j*, on the left side (right of the figure), external arched ligament, attached to the twelfth rib, *h*; *k*, part of the psoas magnus muscle; *l*, transverse processes of the lumbar vertebræ; *n*, tendinous part of the right crus or pillar of the diaphragm; *o*, of the left pillar. (The opening for the œsophagus is shown too much to the left of the figure, and that of the vena cava considerably too much to the right.)

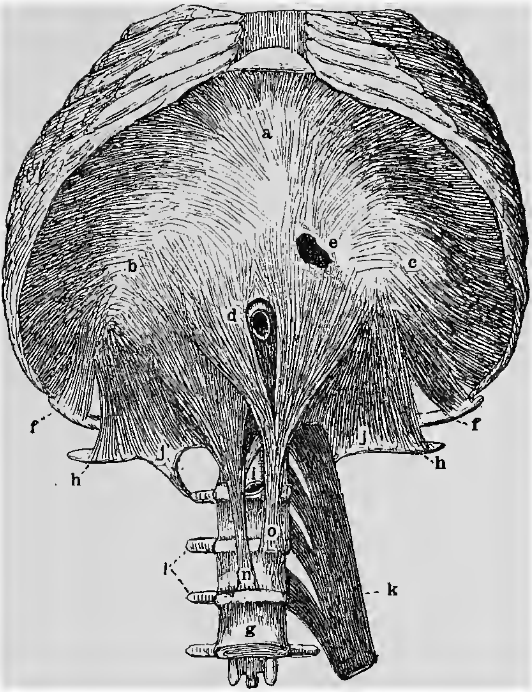

Fig. 6.

SECTION II.—THE ORGANS OF SPEECH.

The Larynx. This is a continuation of the tube formed by the trachea, but differing in structure, on account of the two-fold uses it has to serve. Like a chest it has a framework open above and below, and the shell is of cartilage and bones, to which the muscles employed in articulation are attached (Fig. 12). These cartilages are, the *cricoid*, *thyroid*, and *arytenoids*, with the *hyoid bone.*

The *Cricoid Cartilage* is situated immediately above the uppermost ring of the trachea (Fig. 10, *c*; 12, *k*), itself a larger and deeper ring, narrow in front but gradually widening towards the rear till it terminates in a form resembling a signet ring. This is the basis of the structure.

The *Thyroid Càrtilage* is the largest of all, and has been likened to a shield, or rather a breast-plate, from its shape. Below it enters in two short cornua (horns) (Fig. 7, *d*), which overlap the cricoid (Fig. 12, *u*), and above by two longer horns, which form parts of two pillars, by which the thyroid is united to the hyoid bone (Fig. 12, *e*). The alæ (wings) are united. In front it bulges outward into the protuberance called *Pomum Adami* (Adam's Apple) (Fig. 12, *c*, *f*, *g*). Behind are the vocal cords whose vibrations are most perceptible to touch at this point. Above the apple it parts and curves away on both sides, like the wings of a bow (Fig. 9). This leaves an irregular space which is filled by the lower section of the epiglottis. From the decrease in the width of the cricoid cartilage another narrower space is left between it and the thyroid, resembling a young moon (Fig. 1, above *c*); and both these spaces are very serviceable for touch to perceive the action of the crico-thyroid muscles.

Arytenoid Cartilages. As the functions of these cartilages are essential to the production of vocal sounds, they deserve the closest attention. They are comparatively small and pyramidal in form (Fig. 7, *a*, *a*). By one of its angles and part of its inner base each is attached to the cricoid cartilage (Fig. 12, *i*), which forms a kind of pivot for its action. The apices are surmounted by two small curved horns, which bear the name of Santorini (Fig. 7, above *a*). The base of each arytenoid is slightly hollowed, having towards its inner part a smooth surface for articulation with the cricoid. Two of its angles are remarkably prominent, one external (Fig. 11, *a*, *b*), short and rounded, which projects backwards and outwards, and into which the posterior and the lateral crico-arytenoid muscles are inserted (muscular process), the other anterior, which is more acute, and forms a horizontal projection forwards (Fig. 11, *c*, *d*), to which the corresponding true vocal cord is attached (vocal process).

The *Hyoid Bone* gives attachment to the base of the tongue. It resembles a horse shoe, and consists of five pieces united by ligaments. That in the centre is a plate about an inch in length and two-fifths of an inch in diameter (Fig. 1, *h*); above, it terminates in two blunt cornua (Fig. 8, *b*, *c*). The two side bones at their tips rest on two little pillars, which, united by ligaments with the long horns of the thyroid (Fig. 12, *e*), complete the structure externally. Its strength, compactness, and elasticity are eminently adapted to its special uses.

Muscles of the Glottis. Voice is produced, as in a musical instrument, by air on approximated lips or cords, and provision is made for the action by muscles so situated as to close, open, lengthen, or contract them, as the pitch and intensity of the sound may require. This is done by muscles having different attachments and functions.

Beginning with the *Crico-thyroid* muscle (Fig. 8, *g*), it is seen to be a short triangular muscle in the front of the larynx. Below, it is attached to the cricoid cartilage and extends from the median line a considerable way backwards; and its fibres, passing upwards and outwards, diverging slightly, are fixed above to the inferior border of the thyroid cartilage, and to the anterior border of the lower horn. By its contraction it draws the anterior part of the thyroid cartilage downwards, and thereby lengthens the distance between it and the arytenoid cartilages, thus putting on the stretch the vocal cords and raising the pitch of the voice.

The *Lateral crico-arytenoid* muscles are attached at their lower extremities on either side to the front of the cricoid cartilage at its upper border (Fig. 10, *h*, 11, 5). They pass upwards and backwards, and are attached to the muscular processes of the arytenoids ; their action is to rotate these cartilages so that the vocal processes are approximated and the vocal cords themselves brought nearer together.

The *Posterior Crico-arytenoid* muscles are attached below to the cricoid cartilage on the back of the seal side of the ring, and passing upwards are attached to the outer angle of the base of the arytenoids (Fig. 8 *f*, and Fig. 9). They act upon the vocal cords by drawing the outer angles of the arytenoids (Fig. 11 *a*, *b*) backwards and inwards, and thus rotate the vocal processes outwards and widen the glottis ; in this way acting antagonistically to the lateral crico-arytenoids.

The *Thyro-arytenoid* muscle is attached at one extremity to the thyroid, from which it extends horizontally backward to the arytenoids (Fig. 10 *g* ; Fig. 11, 7 ; Fig. 12 *a*). By its action the thyroid and arytenoids are approximated, thereby lessening the tension of the vocal cords and allowing deeper tones to be produced. By a thin band of fibres along its upper edge the glottis can be narrowed and the cord put into the vocalizing position.

If both the posterior and lateral crico-arytenoids are thrown simultaneously into action, the arytenoids will not rotate, but will be drawn downwards and outwards, so the glottis will then be widened.

Two other muscles, the thyro-epiglottic and aryteno-epiglottic, are attached to the epiglottis outside near its margin and pass downwards obliquely, the former to the thyroid cartilage, which it joins near the attachment of the thyro-artenoid.

The *aryteno-epiglottidean* muscles, arising near the inferior and outer angles of the arytenoid cartilages, cross one another, and their fibres are partly attached to the upper and outer part of the opposite arytenoid, partly pass forwards in the aryteno-epiglottidean fold, and partly join the fibres of the thyro-arytenoid muscle. The oblique arytenoids (Fig. 9) are now considered part of this muscle. These muscles both draw together the arytenoid cartilages, and draw down the epiglottis so as to contract the whole superior aperture of the larynx.

The *arytenoideus* muscle passes straight across between the arytenoid cartilages (Fig. 9), and its fibres are attached to the whole extent of the concave surface on the back of each. They first draw the arytenoid cartilages together, and then rotate them in such a manner that the vocal processes are drawn apart and the glottis is widened, and at the same time it is depressed.

These are the muscles which act upon the vocal cords and render them efficient in all the variations of tone and expression required by speech and song.

But to obtain a clearer idea of their action let us make a horizontal section of the dissected larynx, just above the vocal cords.

This section of the larynx with the *Glottis* in its centre, looked at from above, presents the form of a semi-ellipse or horse shoe, the tip of the horse shoe being the front of the thyroid cartilage, or the "Adam's apple." Within this horse shoe lies the cricoid, or ring cartilage (Fig. 11, 9, 9), as a segment of an ellipse, the longer diameter being from front to back. Upon the posterior rim of the cricoid stand the two arytenoid or pyramid cartilages (Fig. 11, *a*, *b*), side by side, but a little apart, and approaching one another at their horns or tips (Fig. 7, *a*, *a*) (very exaggerated in the diagram), which also curve in a backward direction.

Each of these cartilages has two prominent angles at its base; one pointing outwards (Fig. 11, *a*, *b*), called the muscular process; the other, called the vocal process, projecting towards the front of the glottis (Fig. 11, *c*, *d*). It is to this pair of vocal processes that the vocal cords are attached, whence they pass to the inner surface of the front of the thyroid, *i.e.*, to the tip of the horse shoe. Stretched tightly across from back to front, these have the appearance of two thin, yellowish-white threads running side by side (Figs. 11 and 13), and between them lies the opening into the trachea, the slit or rima of the glottis. During deep breathing, however, the slit takes the form of a triangle, having its apex to the front, for the vocal cords do not run parallel, but are wider apart at the back, where they join the arytenoid cartilages (Fig. 11). The posterior end of the slit is closed by the transverse arytenoid muscle, which runs from one pyramid cartilage to the other across their backs.

The pyramid cartilages, from the nature of their position and their power of adjustment, are the principal agents in adapting the form of the slit to the production of the various tones of the voice, by means of the relative position and tension of the vocal cords. These adjustments are brought about by the muscles of the interior of the larynx, which in our bird's-eye view are seen running in pairs between their different points of attachment.

Parallel with the vocal cords, and just on the outside of them, lie the narrow strips of the thyro-arytenoid muscle (Fig. 11, 7), firmly attached in front to the thyroid just beside the point of attachment of the cords themselves, and at the back to the front surface of the arytenoids. Outside these at a deeper level, and also running from back to front, are the shorter and broader bands of the lateral crico-arytenoid muscles (Fig. 11, 5), passing from in front obliquely upwards and backwards along the rim of the cricoid cartilage, and attached behind to the outer (muscular) processes of the arytenoids. These muscles, with the cricoid cartilage itself, fill up the greater part of the front half of the section; the back part behind the arytenoids is taken up by the "signet" part of the cricoid, hidden, however, from view for the most part by its covering of muscles, viz., the (transverse) arytenoideus above mentioned connecting the arytenoids at the back, and thus closing the glottis behind, and the pair of posterior crico-arytenoids (Fig. 9 and Fig. 11, 4, 4) running from their attachment to the outer part of the bases of the arytenoids, downwards and inwards, over the posterior surface of the cricoid.

The two ligaments (Fig. 11, *o*, *o*) connecting the arytenoids with the cricoid cartilage complete the general view of the section as seen from above.

The actions of the interior muscles of the larynx may be briefly summed up thus :—

The general action of the thyro-arytenoids is to draw the thyroid and arytenoid cartilages together, and so relax the vocal cords.

The lateral crico-arytenoids rotate these cartilages in such a manner as to cause the vocal processes to approach one another and so to narrow the slit.

The posterior crico-arytenoids rotate them in the opposite direction, and so widen the slit.

The (transverse) arytenoideus draws the back of the arytenoids together, with the effect of narrowing the slit, and at the same time depressing the glottis.

The practical object sought by this detailed description of the glottis, is to give the student not only clear conceptions of its actions on speech, but also to enable him to apply his knowledge to the special work of teaching the deaf to speak. Muscular action is a form of motion, and this in the glottis is perceptible by touch. We can not only feel the vibrations of the cords in vowel sounds, but the action of the muscles in raising or depressing the whole larynx. The action of the crico-thyroid muscle is also itself perceptible if we place the fourth finger on the vacant space between these cartilages. By pressure, too, on both sides of the thyroid cartilage with finger and thumb we can change the pitch of the voice. We are, therefore, in possession of very valuable appliances to enable the learner to become acquainted with the organ—in action—of his own voice in its vibrations and muscular shifts.

For him this knowledge means an increase of intuitive perception of the vibratory nature of voice and with it of power, for to know something of sounds intuitively is to be able to imitate them. But in addition to this, to be able to perceive the muscular action of the larynx in its different movements in obedience to the pitch of the tone is to be able to escape the monotony complained of in the speech of the deaf, and vary the tones also according to their pitch. If the hand of the learner is placed on the larynx of his teacher all this can be made evident to him by the rise and fall of the larynx. But the vowels ought to have associated consonants so that the fullest action may be felt, as in *DA, KA, TA, PA*. What the learner most needs is something to suggest what the ear would have done, and touch to a great extent serves this purpose in the perception of sound. It is true we cannot find any substitute for the lost music of speech, but we can endow him with the ability, by tone, accent and emphasis to feel and know that he has sufficient power over his organs to express all his thoughts so that he can be heard and understood by others. Half the distance is thus covered which separates him from the hearing.

The voice as it is thus issues from the glottis is never heard by us in its primitive form, but is largely modified by the shape and resonant properties of the walls of the tube through which it has to pass before it escapes to the open air. Beginning with the larynx these will be noticed in detail.

The Larynx. This is the term which is applied to the vocal apparatus itself from its lowest cartilage—the cricoid—to its highest—the epiglottis. The tubular passage through it, and forming a channel for the passage of the air to and from the lungs, is constricted in the centre at the glottis, and has been compared to a sack tied in the centre, to which it has a faint resemblance (Fig. 13). Below the vocal cords the passage widens out gradually to the calibre of the trachea, laterally; but from before, backwards, has nearly the same diameter as the trachea which is immediately below it. It thus forms an inverted funnel with a slit at the top. This is its form during articulation; during free voiceless respiration the hinder part is much more widely open above, and the glottis, instead of being a slit, is of triangular form.

The space above the glottis is more complicated. Above each vocal cord is a fold of the lining mucous membrane, forming a deep, lateral depression, separating the true from the false cords (Fig. 13, *x*). These depressions are termed "ventricles of Morgagni," and the false cords which run parallel with the true, at a higher level, are merely prominent folds of mucous membrane (Fig. 13, *g*) with no elastic ligament in their structure, as is the case in the true cords. Their contribution to the production of voice is not determined; it is probably very small. The ventricles, however, are believed, even in man, to give some resonance to the voice. In some animals, as the howling monkey, they are greatly developed, and give the peculiar character to the animal's cry from which it has derived its name.

Above the false cords, the sides of the larynx fall away towards the arch of the hyoid bone, and above this to the sides of the pharynx.

Behind the larynx is situate the œsophagus (Fig. 14, *œ*) or gullet, and the posterior wall of the vocal apparatus in this part does not extend above the summits of the arytenoid cartilages.

In front, the cavity of the larynx passes up into the mouth, but instead of the anterior wall merely sloping up on to the back of the tongue, the leaf-like cartilage called the *epiglottis* projects upwards from the level of the upper edge of the thyroid cartilage, and is so related to the back of the tongue that when any food is about to be swallowed this latter organ is thrust back, carrying the epiglottis with it, which effectually closes the orifice of the larynx (Fig. 14, *g*), so that the food passes over the base of the tongue to the œsophagus (Fig. 14, *œ*), through which it passes down by special muscular action. But if, from undue haste, or speaking while eating, some crumbs should find their way into the larynx, their presence is at once detected and a strong cough speedily ejects the intruder. The epiglottis projects into the pharynx and can be seen when the base of the tongue is pressed close to its couch.

The parts of the larynx below the epiglottis can only be seen by means of reflection in the small mirror of the laryngoscope,. and the view is open to misconstruction unless allowance be made for foreshortening. The hyoid bone serves as a strong frame for the epiglottis and larynx, the upper opening into which it embraces with its long horns, at the same time giving support and purchase to some of the muscles of the tongue and pharynx. It really forms the crown and completion of the voice box.

The hyoid bone forms a barrier to the backward retreat of the tongue, for its two long horns stretch towards the opposite wall of the pharynx, where its two short feet unite with the long horns of the thyroid cartilage. The muscular action required by speaking and swallowing is felt at the time, and if the finger is placed on the top of the thyroid cartilage the different movements can be perceived and may suggest their imitation by the scholar in learning to speak.

All but the initial part of the muscular action of the tongue in swallowing is involuntary, but it can be utilized by leading the learner to feel that he is already in possession of the power to withdraw it for the articulation of guttural sounds. Let him attempt the first action and feel with his finger its direction, and the perception of its nature will lessen the difficulty sometimes found in getting him to comprehend what is required of him in respect to the second.

The Pharynx (Fig. 14, *ph*) is the open space above the larynx, and extends upwards to the entrance of the nostrils. It is partly closed in front by the *velum palati* (soft palate) (Fig. 14, *v*), ending in the uvula and by the base of the tongue, but altogether behind by the wall of the cervical or neck vertebræ. Its form is therefore irregular, and, in addition, it is subject to many changes from the action of the velum palati in uttering nasal sounds, and the movements of the tongue in many others. As a part of the tube through which the voice passes after leaving the larynx, its changes of form must largely influence its pitch and timbre, at one time lending it greater fulness and clearness from its resonant properties, at another reducing it to roughness and sharpness.

The bent form of the epiglottic part of the larynx deflects the voice (Fig. 14 *ph*) so that it impinges against the cervical wall of the pharynx, and thence deflected at the same angles passes over the base of the tongue (Fig. 14 *t*), and again impinging on the soft and hard palates (Fig. 14, *v*, *a*), from which it is a second time deflected, escapes between the teeth and lips to the external air. But when the veil is dropped, in pronouncing *m*, then it impinges on its posterior side, and, after a variety of deflections, escapes through the nostrils. If the mouth is opened to its full extent and the tongue depressed on its couch so as to free the glottis as much as possible, the sounds uttered in these conditions are found to vary considerably in resonance from what they do when permitted to receive the full influences of the pharynx in its normal action.

The muscles peculiar to the pharynx (Fig. 16) and employed in its various functions are :

1. The *inferior constrictor*, or *laryngo-pharyngeus* (Fig. 16, *l*), which is attached posteriorly to the cervical wall of the pharynx, and anteriorly partly to the thyroid cartilage, and partly also to the cricoid (Fig. 16, *e*, *f*). This muscle contracts that part of the pharynx to which it is attached, and contributes largely to passing down the food, at the same time elevating the larynx.

2. The *middle constrictor* or *hyo-pharyngeus* (Fig. 16, *k*), which is attached posteriorly to the wall of the pharynx, about the middle, on which it spreads out, and, dividing anteriorly, one of its parts is attached to the long horns of the hyoid bone, and the other to the short horns. This muscle acts specially on the hyoid bone, to which it has a fourfold attachment, and has much to do with the action of swallowing,

and "compresses that part of the pharynx which is covers."

3. The *superior constrictor*, or *gnatho-pharyngeus* (Fig. 16, *j*). This muscle, like the others, is broad, thin, and partly covered by the middle constrictor. It is attached to the occipital bone in front of the large foramen (through which the spinal cord passes), to the pterygoid process of the sphenoid bone, to the lower jaw near the last molar teeth, and to the pterygo-maxillary ligament, which separates it from the buccinator muscle. Some fibres also are attached to the side of the tongue and palate. "It compresses the pharynx at the upper part; for the constrictors act in succession and contract that portion of the alimentary canal when it is filled with food and force it downwards into the œsophagus." Its action can be partly felt when we swallow some food. The functions discharged by these three muscles of the pharynx are very important in the reception of food. Extending from the skull above to the rings of the trachea below, they are chiefly concerned in the process of deglutition, but also contribute slightly to the movement of the larynx as a whole, and to the capacity of the pharynx during speaking. Their share in the raising of the larynx is small compared to the following.

Immediately external to the constrictor muscles of the pharynx is:—

4. The *stylo-pharyngeus* (Fig. 15, *p*), which is fixed above to the styloid process of the petrous part of the temporal bone, near its root, and proceeds thence downwards and inwards. Below it gives a few fibres to the constrictor muscles, is connected with the palato-pharyngeus (see below) and ends on the upper and hinder borders of the thyroid cartilage. By its contraction the larynx is drawn up and somewhat backward.

The muscles moving the larynx as a whole are, (1) the elevators and (2) the depressors.

(1) The elevators are the *stylo-hyoid* (Fig. 15, *o*) which connects the styloid process with the hyoid bone,

at the union of its body with its greater horn. This raises the hyoid bone and with it the larynx, at the same time drawing it backwards.

The *mylo-hyoid* (Fig. 16, *p*). This is attached above to the inner aspect of the lower jaw on each side from the last molar tooth to the middle line in front (called the symphysis). Below, its fibres are attached to the body of the hyoid bone. The two muscles together form the floor of the mouth.

The *Genio-hyoid* (Fig. 15, *w*) arises from the lower of the tubercles behind the symphysis of the lower jaw (*symphysis* means the point of union of the two sides of that bone), and in contact with the last named muscle, which is above it, passes near the middle line, next its fellow of the other side, to be inserted into the front of the body of the hyoid bone. This muscle, with the preceding, raises the hyoid bone and with it the larynx, but at the same time drawing it forward.

The chief elevator of the larynx in the production of high notes is the *thyro-hyoid* muscle (Fig. 15, *s*), which is attached below to the oblique line on the outer surface of the thyroid cartilage and above to the body of the hyoid bone. For its effective action the muscles, which have already been described as raising the hyoid, must fix that bone.

(2.) The depressors of the larynx are the *Sterno-hyoid*, which is attached below to the back of the upper border of the sternum and the parts immediately outside this part, and above it is inserted into the body of the hyoid bone. Its action is to depress that bone and the larynx.

The *Sterno-thyroid* is in front of the preceding muscle at its origin from the sternum, and above attaches itself to the oblique line on the outer surface of the thyroid cartilage. This muscle depresses the larynx as in the production of low tones, and if also associated with the thyro-hyoid can depress the hyoid bone and structures attached to it.

Another muscle, the *Omo-hyoid*, also depresses the hyoid bone, and to some extent the larynx, at the same time pulling it rather backward. It is a slender band of muscular fibres passing from the notch on the upper border of the scapula (shoulder blade) to the hyoid bone, On its way it passes under the sterno-mastoid muscle where it becomes partly tendinous, and works in a fibrous sheath. The attachment of the sheath to the sternum gives a downward direction to the pull of the muscle which it would not otherwise possess.

The Soft Palate. This is a crescent shaped curtain with a dependent middle, the *uvula*, which hangs down (Fig. 14, *v*; Fig. 18, *c*). The horns of the crescent rest on the base of the tongue on either side. It is attached to the hard palate at a more advanced point, whose curve it continues and completes. It is called the *velum pendulum palati*, or hanging veil of the palate; and its chief function is, like a veil, to rise in order to let the voice pass through the mouth, or fall to deflect it through the nose. When depressed it reposes on the rounded portion of the back of the tongue on either side. It is visible over the base of the tongue, where it forms two small arches, divided by the uvula (Fig. 18, *c*, *f*). Its movements in speech are secured by muscles.

The first, *palato-pharyngeus*, (elevator of the pharynx) (Fig. 18, *e*), is situated in the soft palate and wall of the pharynx. Above, it lies in the soft palate, taking origin partly from its fellow of the opposite side, partly from the fibrous tissues of the soft palate, and partly from the edge of the hard palate. Passing down from this position its fibres run in the posterior pillars of the fauces on each side; these are the hindmost of the two folds of membrane enclosing the tonsils. The muscle passes down in the pharyngeal wall to be attached to the posterior edge of the thyroid cartilage which other fibres spread out in the pharyngeal muscles. By the combined action of the two muscles the soft palate is depressed, and the pharynx and larynx raised, while the mouth is cut off from the nose and throat by the approximation of the pillars of the fauces. The second, the *Palato-glossus*, forms a muscular layer in the substance of the soft palate in front of the other muscles. At the middle line its fibres are continuous with those of its fellows on the other side. It passes out of the soft palate into the anterior of the two folds on either side of the tonsil, and below is lost on the side of the tongue. Its action is similar to the preceding. The third, *levator palati* or *veli* (Fig. 18, *a*) (elevator of the palate), is attached to the apex of the petrous (bony) portion of the temporal bone, and to the adjoining margin of the Eustachian tube (Fig. 14, *e*), whence it descends into the soft palate (Fig. 16, *j*). Its action raises the velum, tilting its free edge backwards* (Fig. 14, *v*, and Fig. 18). The *Azygos uvulæ* (elevator of the uvula) (Fig. 18, *f*), disposed like a cross band, which is attached to the hard palate above, and extends to the uvula at its lower extremity, raises the tip of the uvula, and so shortens the mid part of the soft palate.

Another muscle, the *tensor palati* (Fig. 18, *b*), is attached above to the sphenoid bone, at the root of the internal pterygoid plate and adjoining structures, then descending vertically ends in a tendon, which winding round a bony pulley at the lower end of the plate assumes a horizontal plane, being directed inward where it loses itself in the substance of the palate, some fibres being attached to the bony palate. By its action the lateral parts of the soft palate are made tense, but its movements are very limited. Acting from below it opens the Eustachian tube in the act of swallowing.

By these muscles the action of the *velum palati* is controlled, and, in those who hear, their action is perfect without any special training; but in the deaf it looks very difficult, almost impossible, to institute by the aid of the will what nature does independently. Were the muscles so situated that the effects of their action could be seen and felt, there would be little difficulty; but, hidden away as they are from both senses, the suggestives are absent which would enable us to assist. But there is really no difficulty, for nature has already supplied the training. The reception of food never takes place without the very action demanded by speech, for the veil is drawn down to prevent its return into the mouth when it has passed over into the pharynx and is raised again to permit its entrance, and the same, in fact, with every respiration in which the mouth is the sole passage for the air.

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* In the first edition this sentence ran thus:—"Its action raises the velum forwards, when nasal vowels are wanted." This shows Arnold's opinion, but it was based on an incorrect view of the action of this muscle.—A. H. J.

And from this it is also evident that in order to prevent every vowel becoming nasal—a tendency found in some of our scholars—the free passage of the air in respiration should precede the vowel sound and the head be erect at the same time, and the latter will naturally follow its leader. Touch assists so efficiently in the nasal vowels themselves that the attempt to imitate the vibrations felt on the nostrils is usually successful.

The Tongue (Fig. 15, *d*).—Its place and form need no description. Its uses, too, are well known in masticating and swallowing, in taste, touch, and speech. But the last is the most important, and for this its construction is eminently adapted. Guided by the ear it moves freely into every position required by articulation, and afterwards returns to their repetition as if by instinct. This great mobility arises from its structure. It looks as if formed of a confused mass of muscular fibres, but really their arrangement is most perfect; for if we follow them carefully they are found to be distinct ramifications of three principal muscles on each side, or three pairs in all, from three directions, intimately bound together and attached at their extremities. Three other and smaller muscles are also found, which are special to the tongue, and their attachments within itself. As it lies in its bed it looks a long body, flat at the top or dorsum, round at the edge, and finely fretted with papillæ which we know to be those of touch and taste. But beneath it is different in form (Fig. 15). It is attached to the floor in such a manner as to permit the dorsum, tip and sides the freest action in every direction, and its base or root is attached to the epiglottis, with which a fold of mucous membrane connects it, called the *glosso-epiglottic ligament;* and another fold seen when the tongue is raised, the *frenum linguæ*, or rein of the tongue, passes from the under surface of the apex downwards to the floor. When this is too short to let the tongue have free action, it is said to be "tied."

(a) The first of the three pairs of muscles is the *genio-hyo-glossus* (Fig. 15, *y*). They lie together on the lower side, and form the basis as well as a considerable part of the mass of the tongue. Its most fixed attachment is to the lower jawbone, at the back or inner surface of that portion which forms the chin, where are two small projections of bone called the *upper genial tubercles.* Thence passing backwards and upwards they spread out through the whole tongue till their uppermost fibres terminate in the apex of the tongue, and their lowest at the hyoid bone, where the dorsum terminates. The function of this muscle is to obtrude, retract and depress the tongue. But its obtrusive action is not employed in speech, for it never passes beyond the teeth in the articulation of any sound. Its depressing power is of greater importance, for by it the tongue can be kept close to its floor out of the way for the full utterance of certain vowels.

(b) The *hyo-glossus* (Fig 15, *t*; 16, *q*) is the second pair of muscles. At one end they are attached to the greater horns of the hyoid bone, then they pass close by the lateral wall of the pharynx above the hyoid bone, and over the surface of the genio-hyo-glossus to the tongue, through which they spread. As their function they have to draw the tongue backwards and downwards, so rendering it convex on the dorsum.

(c) The third pair is the *stylo-glossus* (Fig. 15, *n*). At one end it is attached to the styloid process (Fig. 15, *f*) of the temporal bone, whence it passes down near the upper part of the pharynx, then forwards to the apex of the tongue, on a higher level than the hyoid bone.

When the tongue is protruded it draws it back into the mouth. If in the mouth its further action presses the base of the tongue upward against the palate. At the beginning of swallowing it helps to pass the food backward, after which other muscles take up the further task of delivering the food into the gullet.

These are the three principal pairs of lingual muscles. They are all attached to some other structure at one extremity, but perfectly free at the other. If the points of attachment are considered, it is evident that they resemble three cords in an ascending order, firmly attached to enable the tongue to move freely in these directions.

But in addition to these the tongue has three other muscles situated within itself and attached only to points in its own structure. These are :—

(1.) The *Lingualis inferior* (or the lower tongue muscle). This is a round band running longitudinally the whole length of the tongue between the hyo- and genio-hyo-glossus muscles.

(2.) The *Lingualis superior* (or upper tongue muscle). This is a thin layer of oblique and longitudinal fibres which spread over the dorsum under the mucous membrane.

(3.) The *transversalis Lingui.* A collection of separate bundles of muscles which spread transversely through the tongue from its base to its apex.

These three sets are free to adapt the tongue to any angle, curve or surface ; to arrest the air or voice, or to secure their full or partial emission. The function of the two longitudinal muscles, by their contraction, shortens the body of the tongue, thus rendering it wider and thicker.

But the lingualis superior contracts the upper side only ; the inferior, the lower side. When the former is acting the tongue curls upwards ; when the latter downwards. Again, if the muscle is acting only on one side, the tip is turned toward that side on which the muscle is contracting, and the relaxed muscle forms the convexity of the curve.

The capacity for motion with which these muscles endow the tongue is practically unlimited, as is well exemplified in the phonetic elements of the languages of all nations. We need not wonder that it became synonymous with language itself, for it has the lion's share in most of the modifications of sound. In addition to these functions there are in its neighbourhood ducts and glands, the *sub-maxillary* and *Wharton's duct* and *sublingual gland*, for the secretion and conveyance of the saliva necessary to mastication and the free action of the organs of speech.

The Nose: its Cavities and Muscles. The nose, like the mouth, has a principal place in the emission and modification of the voice. It is the alternative passage for respiration and the seat of the sense of smell. On account of its peculiar structure and resonant properties, whatever vocal sounds pass through it, differ both in timbre and pitch from those emitted through the mouth. Hence they are called nasal. The entrance at the apex of the pharynx (Fig. 14, behind *v*) is narrow as compared with the chamber into which it expands. As a whole it may be described as a small chest open at both ends, but unlike it in its internal structure; for, instead of having only bare walls on every side, it is divided by partitions into smaller chambers connected by corridors and outlets, whose walls are bent and curved,—with the exception of the *septum*, or partition—into a little labyrinth. (Fig. 14, *n.*) These partitions are formed of cartilages and bone. The great mobility of the extremity of the external nose permits the regulation of the air which enters the cavity; and a ring, formed principally by the lower lateral cartilage, keeps the nostrils open for its admission.

The Facial Muscles. It is admitted that speech is accompanied by visible facial movements, arising from the muscular action of the organs in the articulation of the sounds. The mouth, lips, cheeks, jaws, nose and tongue participate in their turn in the utterance of every word; for many of the movements to which articulation gives rise are also outward, and correspond with internal muscular action. It is true that there is little formal resemblance between them and the sounds, but as they are the same for each sound they can be observed and registered like any other class of natural phenomena. And when this is done it is found that there is an alphabet of motions, produced by the phonetic alphabet. Not that every sound is sufficiently expressed on the face to be read with ease, but the majority are so, and by their union with the weaker elements in syllables, words, and phrases, can all be read.

These facial expressions are due to muscular movements, chiefly in the face, so that the position, attachments, and areas of action of the muscles concerned can be ascertained. If this is carefully done we know what muscles will act in any sound or combination of sounds. There is no uncertainty in this if the sounds are fairly well pronounced. Lip-reading is, therefore, founded on the laws of motion, and not on imaginary semblances. The teacher ought, therefore, to acquaint himself with the muscular mechanism of these facial expressions, so that he may know how they are produced, and how to direct his scholar to their correct reading.

Each facial muscle has its place, attachments and functions, and to know these will suffice for our purpose.

Levator labii superioris alœque nasi (elevator of the upper lip and wing of the nose). (Fig. 17, *i*). This muscle is attached above to the nasal process of the superior maxillary bone (upper jaw), underneath the orbicular muscle of the eyelids (Fig. 17, *f*). As it approaches the nose it separates into two portions, one of which is inserted into the ala or cartilage of the nostril, and the other into the upper lip (Fig. 17, *i*). Its action is seen in raising the ala of the nostril and the upper lip, by which the furrow extending from the side of the nose to the angle of the mouth is deepened. Hence all sounds such as *m*, *w*, *oo*, require its elevating force.

Levator labii superioris (elevator of the upper lip), (Fig. 17, *k*). It origin is just below the lower margin of the orbit, and its insertion in the upper lip. Its function is to raise the upper lip and bulge the skin of the cheek below the eye.

Levator anguli oris (elevator of the angle of the mouth) (Fig 17, *l*). Its origin is from the surface of the upper jaw bone just behind the position of the canine tooth, and its insertion is in the angle of the lips. It raises the angle of the lips.

Depressor alæ nasi. A small fleshy bundle below the nostril. Its origin is from the depression of the superior maxilla above the incisor teeth, and its insertion is in the septum and ala of the nose. By contracting it depresses and draws inward the ala (wing) of the nose.

Compressor naris (Fig. 17, *h*). Its origin is in the superior maxilla, and its insertion is in the fibro-cartilage of the nose, and it blends with its fellow over the bridge of the nose. It merely stretches the skin over the nose, the action expressed by its name being performed by the preceding muscle.

Buccinator (cheek muscle, Fig. 16, *i*). Its origin is from the outer surfaces of the alveolar processes of the upper and lower jaws, and from the pterygo-maxillary ligament which stretches between them. In front its fibres become incorporated with the orbicularis oris. This is not shown in the diagram. The contribution of the two buccinator muscles to the movements of articulation is seen in the sounds *e*, *t*, *i*, *k*, *g* and *y*, where the angle of the mouth is retracted towards the ear and the cheeks puckered up. In this action they are associated with the zygomatic muscles (*m*).

Levator labii inferioris, or *levator menti* (Fig. 17, *r*). It is attached to the lower jaw just below the incisor teeth, and is inserted into the skin of the chin. There are two such muscles, one on each side of the middle line. By their action the skin of the chin is indented and the lower lip is raised, as in *p*, *b* and *f*.

Depressor labii inferioris (depressor of the under lip) or *quadratus menti* (Fig. 17, *p*). Its origin is in the oblique line of the lower jaw, and its insertion in the lower lip. Its action draws the lip downwards, and is seen in *ä*.

Depressor anguli oris (depressor of the angle of the mouth, Fig. 17, *o*). This muscle is more superficial than the preceding muscle and the buccinator, and triangular in form. Its origin is on the oblique line of the lower jaw, and it is inserted into the angle of the mouth. Its function is to depress the angle of the mouth. It expresses grief, and in *y* and *l* takes a part.

Zygomatici major and *minor* (Fig. 17, *m*, *n*). Both are on the side of the face, and have their origin in the malar bone. The major *m* is inserted into the angle of the mouth, and the minor *n* blends with the levator labii superioris. They raise the angle with the adjacent part of the lip upwards and backwards.

Masseter (Fig. 17, *v*). Its origin is from the malar process of the superior maxilla and zygomatic arch, and it is inserted into the upper half of the outer surface of the ramus (the ascending portion of the lower jaw) of the jaw, and coronoid process. Its function is in closing the jaws and masticating.

The *Temporal muscle* has its origin from the temporal fossa which is situated below the curved line seen in Fig. 17, to proceed from just to the right of the muscle *a*, and under and in front of the ear muscle *c*. The fascia, or fibrous tissue covering the muscle also gives origin to many fibres. Converging downwards these fibres pass under the bony zygomatic arch (Fig. 17, *z*) to be inserted into the inner surface of the coronoid process of the lower jaw, which lies hidden under the masseter muscle. It is a very powerful muscle, which closes the jaw.

Pterygoideus externus is situated in the zygomatic fossa, and its origin in one part is on the external surface of the pterygoid process, and in the other to the zygomatic temporal surface of the sphenoid bone. It is inserted into the anterior part of the neck of the condyle of the lower jaw. This muscle draws the jaw to the opposite side and forwards.

Pterygoideus internus (Fig. 18, *l*). It arises from the pterygoid fossa. Its fibres, tendinous and fleshy, are attached mostly to the inner surface of the external pterygoid plate, and also to the palate bone. Thence arching downwards with a direction backwards and outwards, it is inserted into the rough mark on the inner side of the ramus of the jaw (Fig. 18, *i*). Its function is to elevate the jaw.

The masseter, temporal and internal pterygoid muscles are elevators of the lower jaw, and generally acting in concert bring the lower teeth into forcible contact with the upper.

Orbicularis oris (circular lip muscle, Fig. 17, *t*). This muscle is a chief agent in all lip movements. It surrounds the mouth, has its fibres in the substance of the lips, and blends by its outer border with the several muscles converging to the mouth, especially the buccinator. It consists of two sets of fibres, an inner and an outer. The latter act in projecting the lips, as in *ū*, and the former in closing them, as in *p*. It modifies most labial vowels and consonants.

Digastric muscle. Its origin is in the mastoid process of the temporal bone (Fig. 15, *e*), and forming a round band of tendinous fibres in the neighbourhood of the hyoid bone, passes through a fibrous loop attached to it, and terminates in a small depression of the lower jaw. It assists in raising the hyoid bone, or depressing the lower jaw, according as one or other of these bones is fixed by antagonistic muscles.

◆

FIGURES 7 and 8.

FIG. 7.

VIEW OF THE CARTILAGES OF THE LARYNX FROM BEHIND.

(Figs. 7 and 8 are the natural size.)

a, *a*, arytenoid cartilages ; at their tips, above, the cornicula or cartilages of Santorini (their approach towards one another is considerably exaggerated in the figure) ; *i*, muscular process of the left arytenoid ; *c*, cricoid cartilage ; *th*, thyroid cartilage ; *b*, its upper, *d*, its lower horn ; *e*, epiglottis ; *h*, ligament connecting the lower horn of the thyroid with the cricoid.

FIG. 8.

EXTERNAL VIEW OF THE RIGHT SIDE OF THE LARYNX.

a, hyoid bone; *b*, its small, *c*, its great horn or cornu ; *d*, thyro-hyoid ligament ; *e*, upper horn of thyroid ; *f*, posterior crico-arytenoid muscle, partly hidden by the thyroid ; *g*, crico-thyroid muscle, attached below to *h*, the anterior part of the cricoid ; *i*, right wing or ala of the thyroid : above *g*, between it and the thyroid, is seen the crico-thyroid membrane.

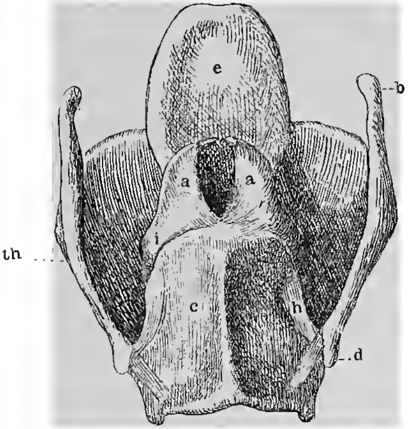

Fig. 7.

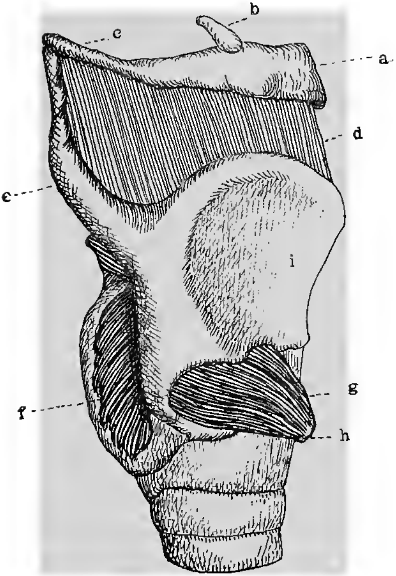

Fig. 8.

FIGURES 9 and 10.

FIG. 9.

Posterior Muscles of the Larynx from behind.

(Figs. 9 *and* 10 *are the natural size.)*

b, placed on the interior of the left ala of the thyroid; *c*, the middle of the back of the cricoid; the two larger muscles running obliquely upwards and outwards from *c* are the posterior crico-arytenoid muscles; they are attached to the lower part of the arytenoids below *i*, *i*, but the attachment is not clearly shown in the figure; *i*, *i*, arytenoid cartilages; between them lies the arytenoideus muscle; *p*, its transverse fibres; *o*, *o*, its oblique fibres crossing one another and passing round the arytenoids to join the thyro-arytenoid and to form the aryteno-epiglottidean muscles.

FIG. 10.

Side View of the Interior of the Larynx.

(The right ala of the thyroid is cut away, to show the muscles next to the rima or slit of the glottis.)

a, upper horn of the thyroid; *b*, inner surface of its left ala; *c*, cricoid; *d*, right posterior crico-arytenoid muscle; *e*, right arytenoid cartilage; *f*, part of the arytenoideus muscle; *g*, thyro-arytenoid; *h*, lateral crico-arytenoid.

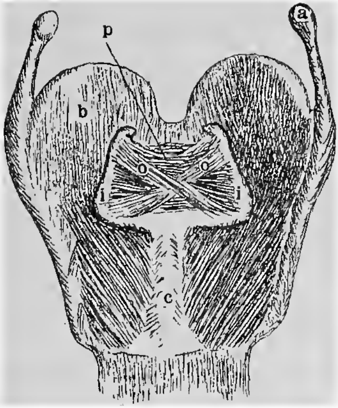

Fig 9.

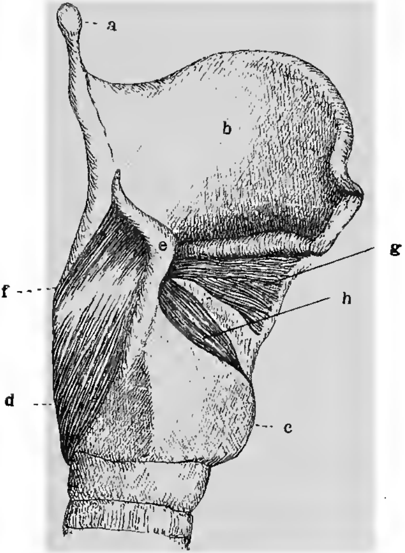

Fig. 10.

FIGURES 11 and 12.

FIG. 11.

DIAGRAMMATIC VIEW FROM ABOVE OF THE DISSECTED LARYNX.

(Figs. 11 and 12 are the natural size.)

1, aperture of the glottis; 2, 2, arytenoid cartilages; 3, 3, vocal cords; 4, 4, posterior crico-arytenoid muscles; 5, right lateral crico-arytenoid muscle (that of the left side being removed); 6, arytenoideus; 7, thyro-arytenoid muscle of the left side (that of the right side being removed); 8, upper border of the thyroid cartilage; 9, 9, cricoid cartilage; 0, 0, posterior crico-arytenoid ligaments.

FIG. 12.

OUTLINE OF THE LARYNX AND CONSTITUENT PARTS.

(The dotted lines indicate the parts hidden from view by the thyroid, etc.)

a, body of the hyoid; *b*, *f*, upper and lower extremities of the epiglottis; *c*, *c*, upper and lower extremities of the thyro-hyoid ligament or membrane, *x*; *d*, the lateral thyro-hyoid ligament; *e*, cartilage joining the horns of the hyoid bone and the thyroid; *g*, *g*, thyroid; *h*, right arytenoid (the outline should be dotted, as it is hidden by the thyroid); *i*, its junction with the cricoid, *k*; *l*, crico-thyroid membrane and space; *m*, horn of left arytenoid; *n*, left, *q*, *r*, right vocal cord; *p*, pouch, or ventricle of Morgagni; *t*, first ring of the trachea: *u*, crico-thyroid joint; *w*, hyo-epiglottic ligament.

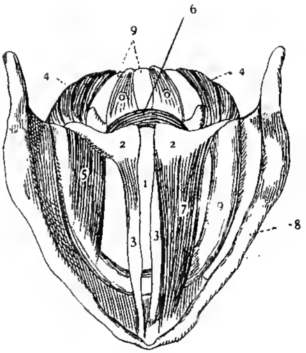

Fig. 11.

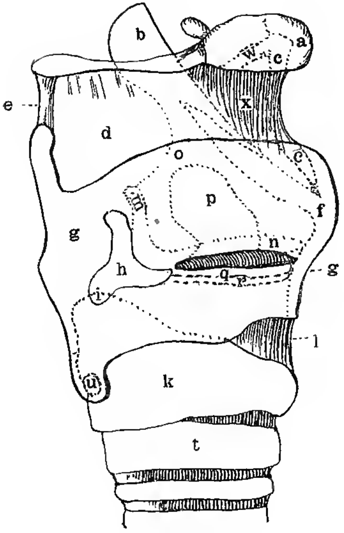

Fig. 12.

FIGURE 13.

FIG. 13.

TRANSVERSE VERTICAL SECTION OF THE LARYNX NEAR ITS MIDDLE, VIEWED FROM BEHIND.

e, epiglottis; *e'*, its cushion; *h*, great horn of the hyoid bone, left side; *f*, thyro-hyoid membrane; *a*, thyro-arytenoid muscle; *d*, thyroid; *c*, cricoid; *g*, *g*, the false vocal cords; *x*, *x*, the ventricles; the one on the right shows the pouch, *o*, more opened by carrying the section further forward; *b*, the right inferior thyro-arytenoid ligament in the true vocal cord, covered by mucous membrane, at the rima of the glottis.

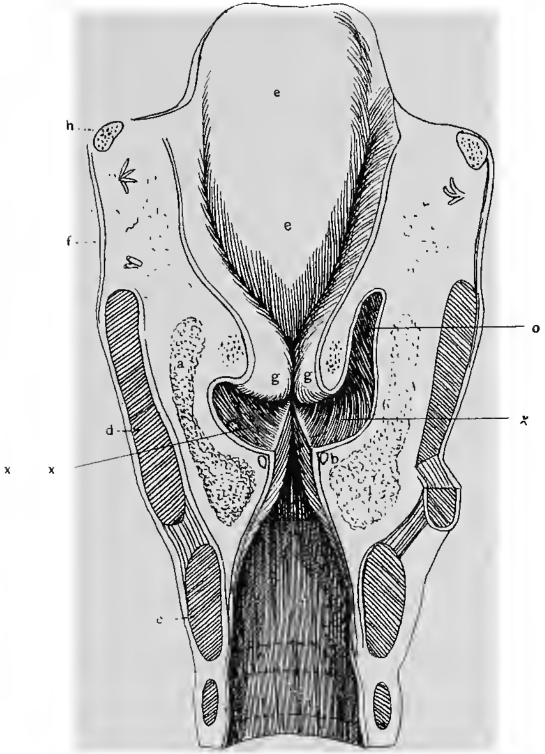

Fig. 13.

FIGURE 14.

FIG. 14.

VERTICAL SECTION OF THE MOUTH AND PHARYNX FROM BACK TO FRONT.

n, placed on the wall of the left nasal fossa; *e*, close by the opening of the left Eustachian tube; *a*, arch of the palate; *v*, velum pendulum palati, the soft palate; *s*, tonsil; *t*, tongue (the letter is placed on the genio-hyo-glossus); *ph*, pharynx; *g*, epiglottis; *th*, thyroid; *œ*, œsophagus. The dark muscle running from the chin below the tongue is the genio-hyoid.

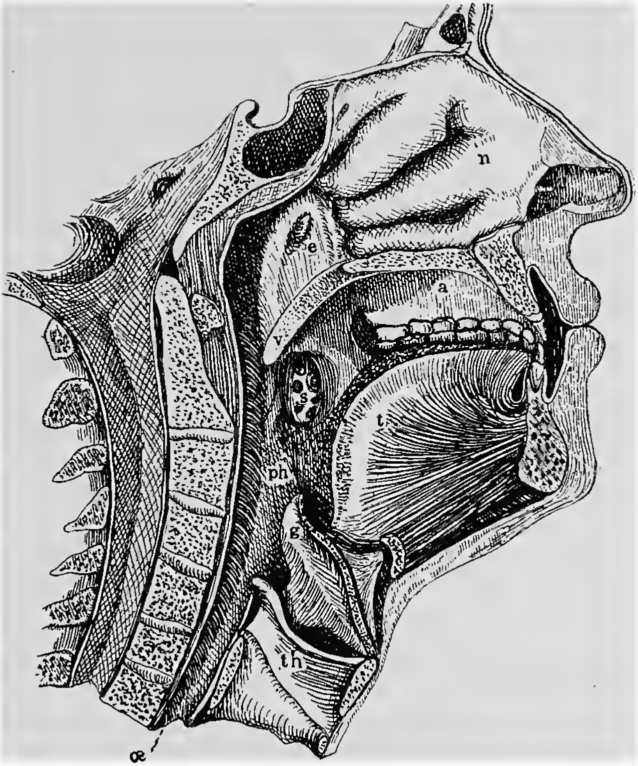

Fig. 14.

FIGURE 15.

FIG. 15.

MUSCLES OF THE TONGUE, PHARYNX, ETC., OF THE RIGHT SIDE.

a, the upper jaw-bone; *b*, that part of the lower jaw which is jointed to the skull drawn up, cut through at the chin, *b′*; *c*, external lateral ligament of the temporo-maxillary joint; *e*, the mastoid process; *f*, the styloid process; *d*, the tongue; below it, *y*, the fan-shaped genio-hyo-glossus muscle; *w*, the genio-hyoid. From *f*, the styloid process, extend three muscles, *n*, the stylo-glossus; *o*, the stylo-hyoid; *p*, the stylo-pharyngeus; and two ligaments, the upper, the stylo-maxillary ligament, running to the angle of the lower jaw-bone, *b*; and *m*, the stylo-hyoid ligament, running to the small process of the hyoid bone; *q*, the superior constrictor muscle of the pharynx; *r*, part of the inferior constrictor; *g*, the hyoid or tongue bone; *t*, the hyo-glossus; *s*, the thyro-hyoideus; *x*, the thyro-hyoid membrane; *h*, the body of the thyroid cartilage; *i*, its upper horn; *j*, cricoid cartilage; *k*, œsophagus.

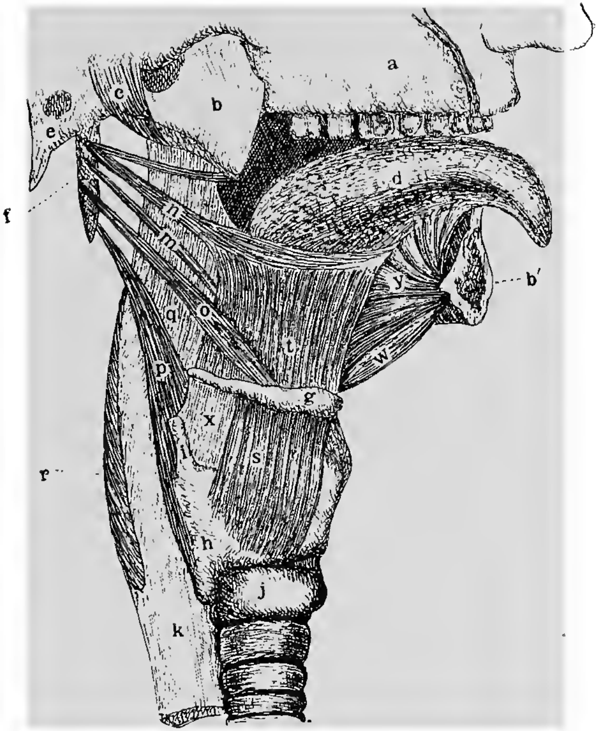

Fig. 15.

FIGURE 16.

FIG. 16.

Muscles of the Cheek, Pharynx, etc.

(Nearly one-half natural size.)

The hinder part of the lower jaw, with the masseter and pterygoid muscles, as well as the muscles attached to the styloid process, have been cut away. *a*, external pterygoid plate; *b*, styloid process; *c*, body of the lower jaw; *d*, hyoid bone; *e*, thyroid; *f*, cricoid; *g*, trachea; *h*, orbicularis oris; *i*, buccinator; *j*, superior constrictor of the pharynx; *k*, middle constrictor; *l*, inferior constrictor; *m*, œsophagus; *n*, lower part of the stylo-glossus; *o*, stylo-pharyngeus; *p*, mylo-hyoid; *q*, hyo-glossus; *r*, thyro-hyoid membrane.

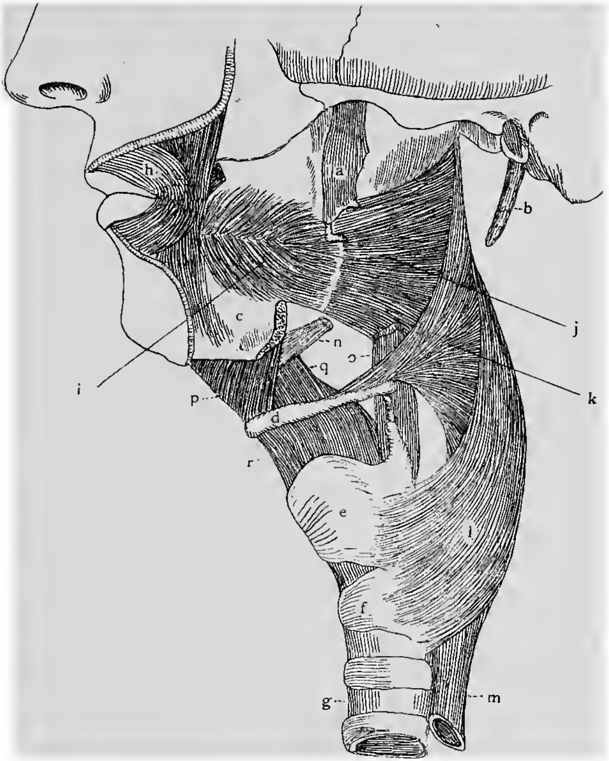

Fig. 16.

FIGURE 17.

FIG. 17.

SUPERFICIAL AND DEEPER MUSCLES OF THE LEFT SIDE OF THE HEAD.

a, frontalis muscle ; *b*, occipitalis ; *c*, elevator of the external ear ; *d*, anterior ; *e*, posterior muscles of the ear ; *f*, points to the orbicular muscle of the eyelids ; *g*, pyramidalis nasi ; *h*, left compressor naris ; *i*, elevator of the upper lip and the wing of the nose (levator labii superioris alæque nasi) ; *k*, elevator of the upper lip (levator labii superioris) ; *l*, a deeper muscle, elevator of the corner of the mouth (levator anguli oris) ; *m*, great zygomatic (zygomaticus major) ; *n*, lesser zygomatic (zygomaticus minor) ; *o*, depressor of the corner of the mouth (depressor anguli oris) ; *p*, depressor of the lower lip (depressor labii inferioris) ; *r*, elevator of the chin and lower lip (levator menti or l. labii inferioris) ; *s*, buccinator ; *t*, orbicularis oris ; *v*, masseter ; *x*, external lateral ligament of the lower jawbone ; *z*, zygomatic arch.

(Below *c* and *d* and covered by them lies the temporal muscle ; a large fan-shaped muscle arising from the branch of the lower jawbone, above the upper insertion of the great zygomatic, *m*, and spreading out over the whole of the temple.)

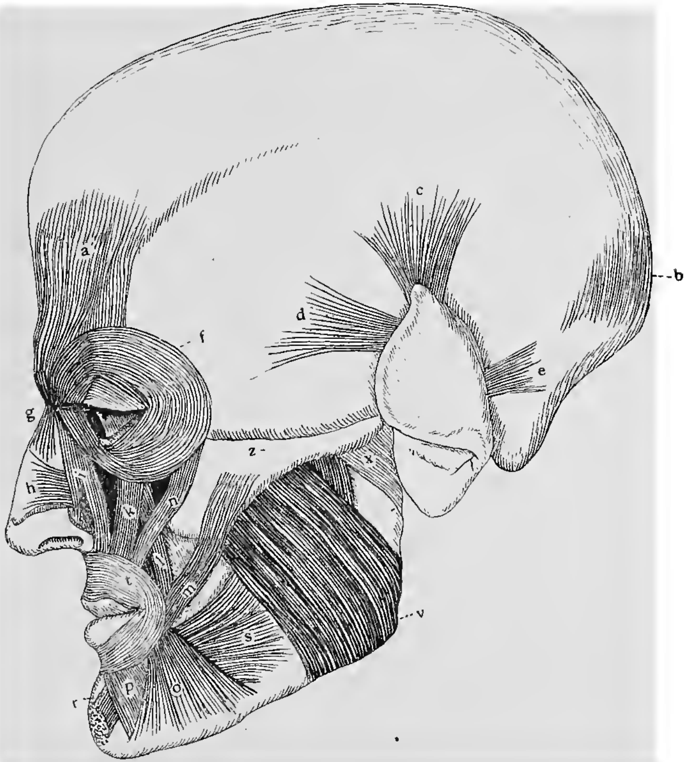

Fig. 17.

FIGURE 18.

FIG. 18.

MUSCLES OF THE SOFT PALATE, ETC., FROM BEHIND.

The back of the pharynx has been divided from top to bottom, and the sides turned back so as to expose the interior. The lining membrane has been removed, showing the constrictor muscles of the pharynx. *h*, part of the sphenoid bone; *c*, *f*, the azygos uvulæ muscle, the lower part of which, *f*, is called the uvula; *e*, *e*, palato-pharyngeus muscles; *o*, tongue; *p*, epiglottis and opening into the larynx; *d*, *d*, superior constrictor of the pharynx; *i*, *i*, angles of the lower jawbone; *g*, *g*, mastoid processes; *b*, *b*, tensor palati muscles; *a*, *a*, levator palati muscles; *l*, *l*, internal pterygoid muscles.

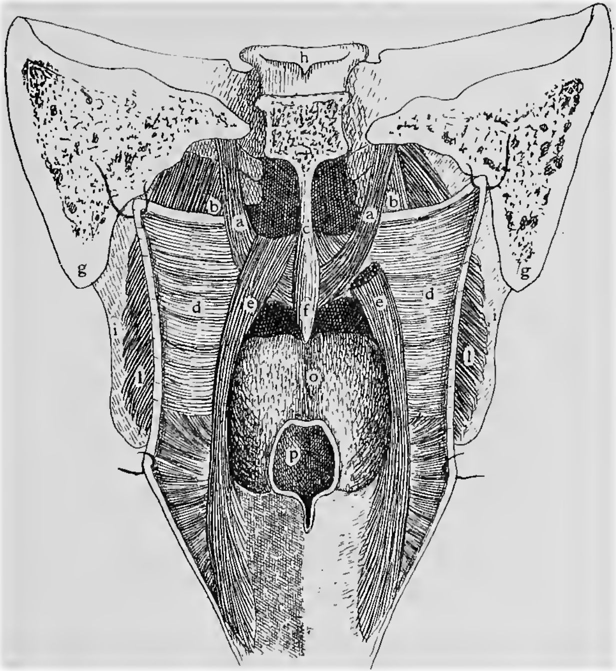

Fig. 18.

SECTION III.—THE EAR.

(By Arthur H. Jones, M.D., M.R.C.P.)

Hearing. Teachers of the deaf have exceptional opportunities and facilities for obtaining evidence of slight degrees of hearing power and utilizing them to the utmost for the general benefit of the pupil, as well as for the sake of the valuable contribution which even a little hearing makes to the progress of his education. In these observations, however, they must confine their efforts to those consistent with the functions of the teacher, and not expect that either their knowledge or experience will enable them to gauge the nature or extent of disease, or to treat affections which are admittedly among the most difficult to deal with.

Deafness is seldom absolute. Its degree varies according to the part of the hearing apparatus affected, or the intensity of the disease by which it is produced. Whether small or considerable, any hearing power is of value, and *any improvement of it which can be attained would be of assistance*:—

I. By *exciting a more active function* in the parts of the auditory apparatus which have escaped damage.

II. By *extending* the pupil's *experience* of the external world.

III. By adding fresh *incentive to thought.*

IV. By *stimulating the mechanism of speech* to the more perfect production of voice.

V. By *re-establishing* or increasing the *normal intercommunication* between the nerve centres presiding over hearing and voice production and opening up their communication with other nerve centres, so reverting to normal relations temporarily lost.

A remnant of hearing power may be cultivated and increased:—

First: *During the teaching of speech.* Sound thus produced in the vocal organs becomes conducted to the inner ear by the bones of the skull, even if none passes by the usual channels. We hardly appreciate how much we are indebted to such conduction for the fullness and clearness of sounds we hear. The sounds we hear are made up by the blending together of vibrations conveyed to the essential organ of hearing through different media, and most, if not all, these channels of conduction convey the sound of our own voice to our hearing organs. Hence, as the voice is developed, so is the ear stimulated, and through it the brain. One of Mr. Arnold's pupils "lost his hearing in childhood, but by keeping up and improving his speech, in process of time he could hear so well, by the aid of a trumpet, that he can converse with his friends with sufficient facility for daily intercourse" (p. 269, 1st edition).

Second : *By contrivances* for communicating external sounds to the ear by unusual channels. To this end vibrations produced by organ pipes, pianos, tuning forks, or even fire-irons, may be conveyed by mechanical conduction to the bones of the head. A piece of wood held by the teeth at one end and placed against the outer case of piano, organ or harmonium at the other, will thus convey the sounds to the ear. The handle of a vibrating tuning fork held to the teeth, forehead, or other slightly covered bone of the head, acts similarly. The audiphone even collects diffused sounds from the atmosphere and conveys them in like manner. A simple contrivance is arranged by suspending a poker by a piece of string and pressing the free end of the string firmly against the opening of the ear with the finger. By then smartly striking the poker vibrations are set up in it, which are conveyed by the string. If sufficient hearing power exist sound is heard, but even otherwise, the vibrations may be felt, which is a distinct gain to the pupil. (See II. above.)

Third : *By improving the mental and bodily health and vigour.* Every healthy function should be developed, and all the organs—those of sense especially —quickened into greater action. The mind should be called into action through the remaining senses. Any remaining power of hearing is by these means likely to be strengthened and the mental and sensory calls upon its exercise increased. Like other organs, exercise, within reasonable limits, improves its function. On the other hand, debilitating causes are to be studiously avoided, especially excesses or bad habits. Care must be taken not to develop one sense at the risk of others, but rather to improve the mental powers through all the senses, in proportion as their capacity will allow; otherwise the special attention in one direction may even divert the pupil's mental effort from directing attention to the revival of the feeble hearing capacity.

Fourth: *By medical aid.* This may materially contribute to the improvement of hearing power, even in bad cases. The aurist's determination whether there is any hearing power left, or any possibility of reviving it, is an essential first step in dealing with all such pupils. Sometimes he can in part repair the damage wrought by disease in the middle ear, or supply some apparatus internal or external—such as ear trumpets, artificial tympana, etc.—that may allow of more sound being conducted to the organ.

To further develop this part of the subject a description of the organs and their mechanism, followed by remarks on the hygiene of the ear, will contribute.

The Organs of Hearing. These may be divided, for the purposes of description, into external, middle, and internal.

THE EXTERNAL EAR. The *external ear* is familiarly known as "the ear"—technically, "the auricle" (Fig. 19, *f*). It is composed of cartilage, covered with skin, and is so disposed as roughly to form a kind of hollow cone leading to the passage called the meatus (Fig. 19, *b*). There are ridges and hollows in the otherwise more or less flattened arrangement of the external ear, which probably concentrate the sound waves into the meatus, though this can hardly be demonstrated scientifically. In the lower animals there are muscles capable of directing the external ear toward any source of sound, but in those animals where their action is most marked the auricle is much more cone shaped than in man. Some people have the power of using similar muscles (Fig. 17, *c*, *d*, *e*, where they appear much larger than in reality), but they do not assist in hearing. This, together with the fact that people who have lost their external ears are scarcely conscious of any diminished hearing power, shows that their contribution to the function of hearing is but very small in the human subject.

The passage leading to the middle ear is called the *meatus* (Fig. 19, *b*). It is oval in section, about 1¼ inch in length, and at first inclines upward a little, afterward bending downward, so forming a curve with the concavity downwards, as may be seen in the diagram. It has also an inclination forward, not being at right angles to the surface. The outer portion is formed of cartilage and the inner of bone, lined with a diverticulum of skin, in which may be found many glands. These secrete the cerumen or wax, which serves in part to exclude insects, and in part maintains the bristly hairs of this region in healthy condition, but occasionally accumulates in excess, giving rise to deafness or other trouble.

THE MIDDLE EAR. The *middle ear*, or *tympanum*, is a space situated at the bottom of the meatus, hollowed out, as it were, in the dense, stony (petrous) portion of the temporal bone. It is lined with mucous membrane, contains air, and is traversed by the small bones of the ear. Being a cavity, and having a membrane stretched across its outer side, it has been compared to a drum and hence its name. The *tympanic membrane* (Fig. 19, *c*, also seen in Fig. 21) separates it from the meatus and is a nearly circular disc of thin membranous character, somewhat concave towards the meatus and placed obliquely at an angle of 45°. On the inner side of this cavity is a bony wall exhibiting two openings, having communication with the labyrinth, or inner ear; these two openings are called the *fenestra rotunda* and *fenestra ovalis*. At the back the cavity of the drum extends into spaces in the bone behind the ear, called *mastoid cells*, some of the more forward of which are seen cut through in Fig. 19, at *t* and *h*. The roof of the middle ear is only a thin lamina of bone separating it from the membranes of the brain. The thinness of this lamina, as well as that between the mastoid cells and the cavity holding the brain, makes it very easy for inflammation of these parts to spread to the brain. For this reason injuries to, and discharges from, the ear assume an importance beyond that of merely threatening the sense of hearing. The anterior communication of the middle ear is by the *Eustachian tube* (Fig. 19, *i*) with the throat (Fig. 14, *e*). This tube is trumpet shaped, having its narrow end opening into the middle ear, and by its broad end communicating in front with the pharynx just above and behind the arch of the palate. It allows of passage of air to, and secretions from, the tympanum. Obstruction of this passage by inflammatory products is the commonest cause of disease of the middle ear.

The *ossicles* (Figs. 20 and 21), or small bones of the ear, are contained in the cavity of the drum and are three in number. They communicate movements of the membrana tympani to the labyrinth, as well as convey vibrations of sound in the same direction.

The *malleus*, or hammer bone (from its supposed resemblance), is the most external of the chain. Its form may be seen in Fig. 20 (*Mc*, *Mm*, *Mn*, *Ml*). The long arm (*Mm*) is called the handle, and being included between the two layers which constitute the membrane, it moves with that structure. The head (*Mc*) is jointed with the next bone in the series—the *incus* (Fig. 20, *I*; Fig. 21, *i*). This ossicle, which derives its name from a fancied resemblance to an anvil—though it is much more like a molar tooth with widely separated fangs—articulates with the malleus by means of its body (*Ib*), has fibrous attachment with the back of the mid-ear by means of a short arm (*Is*) called its short process, and by means of the long process (*Il*) articulates with the third bone of the chain—the stapes. The *stapes* (Figs. 20 and 21, *s*) is the smallest of the three, and closely resembles a stirrup, whence its name. It is joined to the incus on the one side, and on the other fits into the oval opening (fenestra ovalis) on the inner wall of the tympanum, to the margin of which the circumference of its foot plate is attached loosely by fibrous tissue.

Three tiny muscles act on the bonelets of the ear. The *tensor tympani* (Fig. 21, *o*) runs parallel to the Eustachian tube in an adjoining bony passage, at the front of the middle ear. After passing over a little pulley attached to the inner wall of the tympanum, it turns outward and is inserted into the handle of the malleus, near the head of that ossicle. This attachment being below the fulcrum of the bone—which is the long arm (*Ml*) or processus gracilis—the action of the muscle is to draw the handle of the malleus inward and so make tense the membrana tympani. Of the muscular character of the second, the so-called *laxator tympani*, there is much doubt. Its insertion into the malleus *above* the fulcrum would give it power to act in the reverse way to the preceding muscle, forcing the handle of the bone outwards and so relaxing the membrane. The third muscle, called *stapedius* (Fig. 21, *d*), entering the chamber of the middle ear from behind, is inserted into the part of the stapes which is jointed with the incus. This would appear to give it the power to rock the bone from side to side, but it is said that it draws the stapes outward.

The movements of the tympanic membrane are communicated by the ossicles to the fenestra ovalis. The handle of the malleus forms the long arm of a lever, moving that bone on a fulcrum at the processus gracilis, which movement is communicated to the incus and further to the stapes. The joints between these bones facilitate the motions, and by their means the stapes is pressed into the fenestra ovalis when the membrana tympani is depressed and *vice versa*.

THE INTERNAL EAR. The structure of the *internal ear*, or *labyrinth* (Fig. 22) is of great complexity, and its detailed description would be of little value to the teacher, especially because the functions of the different parts have not as yet been fully made out. The portion of the internal ear immediately to the inner side of the tympanum, is called the *vestibule* (*d*, *h*, *i*, and *o*, Fig. 22, are all in the vestibule) and leads to spaces in the bone termed respectively the *cochlea* (Fig. 22, *l*, *e*, *f*; Fig. 23) and *semi-circular canals* (Fig. 22, *a*, *b*, *c*), of which latter there are three. This intricate cavity—the bony labyrinth—the parts of which are called the *bony* vestibule, cochlea and semi-circular canals respectively, is separated from the middle ear by the fibrous membrane of the fenestra rotunda, and at the fenestra ovalis by the base of the stapes and its fibrous attachments, as already described. Following most of its intricacies but at some distance from the bony walls (see description of *k*, Fig. 22), and with some intricacies of their own are similarly named *membranous* vestibule, cochlea and semi-circular canals, themselves filled with fluid and separated from the bone also by fluid. The *semi-circular canals* have to do with the equilibration of the body and are not connected with the appreciation of vibrations of sound. It is within the *cochlea*, a spiral organ of great complexity, that the fibres of the auditory nerve, which convey sound impressions, have their origin, passing thence up to the brain.

Mechanism of the Organ of Hearing. This may be thus explained. The fluid of the membranous labyrinth is the ultimate conductor of the vibrations of sound to the auditory nerve, but the solid bone around allows of resonance which increases the intensity of the vibrations. The communication of sonorous vibrations to the fluid in the membranous labyrinth may be brought about in various ways, all of which combine in the perfect condition of the organ to intensify the effect on the auditory nerves. Conduction by the bone is the simplest and may be demonstrated by holding the handle of a vibrating tuning fork to the teeth or forehead. By this means the voice of a person speaking is partly conveyed to his own hearing apparatus, and some loud external sounds also travel in part by this channel. An instrument, called the audiphone, which makes use of bone conduction, was brought out some years ago. It consists of a somewhat extensive vulcanite expansion which collects the sound waves from the air and conveys them by contact of the handle with the teeth to the solid media of the skull and so to the internal ear. Its value only exists for cases of damage to the middle ear, the labyrinth being intact. Its appearance militated against its frequent adoption, but it no doubt assisted some cases. While vibrating solid bodies can readily impart sounds given off by them to the bones by contact, vibrations in air are scarcely at all so conveyed, but require the intervention of some other conducting mechanism. The same is true as to the conduction from air to fluid media. It is clear therefore, that human beings would hear but little if only possessed of bone conduction. The interposition of a tense membrane between air and a fluid, greatly facilitates the transmission of sound waves from one to the other. The membrane at the fenestra rotunda fulfils this purpose, being interposed between the air of the middle ear and the labyrinth, and prevents a person whose ossicles are destroyed from being as deaf as he otherwise would be. The arrangement at the fenestra ovalis, where the base of the stapes is attached to the margin by fibrous tissue is of even more assistance. The chain of ossicles crossing the middle ear still further increases the conduction, but the addition of the membrana tympani, capable of being varied in its tension, reaches the highest perfection of conductive mechanism. In proportion as any one or more of these is lost so is deafness produced.

A perforated tympanic membrane lessens hearing, loss of or fixation of the ossicles does so still more, especially if the stapes be lost. Thickening of the membrane of the fenestra rotunda retards transmission at that point, but if the internal ear or auditory nerve be destroyed deafness is complete.

Action of the Tiny Muscles of the Ear. The object of the presence of air in the mid ear is to allow free movement of the membrana tympani and to give free play to the ossicles. The membrane is capable of varying degrees of tension under the influence of the muscles of the middle ear. The communication of the tympanum with the air passages by means of the Eustachian tube enables us experimentally to vary the tension of the membrana tympani and so judge for ourselves what the effect is of increasing or decreasing the tension on hearing. If while the nostrils are held and the lips firmly closed, the air in the lungs is forced into the upper air passages, a sudden fulness in the ears is experienced and often a choking sound accompanies this. What has happened is that air has been driven up the Eustachian tube into the tympana, and the membrane has been forced outward and is in a state of tension. The following quotation from Müller occurs in Arnold's original edition, and it well describes the effect :—"The rumbling noise of a vehicle passing over a bridge, or that of a cannon drawn past my home, or of a distant drum is instantly effaced when my tympanum has more tension in either way, while at the same time I hear very well the stamping of horses and the rustling of paper. The effect is very remarkable in regard to the tic-tac of a watch placed eight feet off, which I can distinguish quite as well, if not better, than in the ordinary state when my tympanum is taut, while at the same time this very tension instantly silenced to me the noises in the street."

On removing the fingers from the nostrils some, but not all of this dulness of hearing and tension in the ears passes off, because some equalization of the tension of the air in the tympanum, with that of the surrounding atmosphere is restored. But after the action of swallowing no dulness and no sense of fulness remains, for the muscles of the throat during deglutition have opened the inner (pharyngeal) end of the Eustachean tubes and restored equilibrium fully. The inflation produced in our experiment is called Valsalva's, from his being the first to describe it. The reverse process of causing a vacuum in the middle ear may be tried. The nostrils and mouth being closed as before, forced inspiration is attempted instead of expiration. Again a strain is felt in the ears and the sharpness of hearing is lost. Air has been drawn out of the drums and the natural concavity of the membrane has been increased. It is in this direction that the tensor tympani muscle produces its tension.

These experiments show that sounds of different pitch require different degrees of tension of the tympanic membrane for their perfect conduction to the internal ear. The chief element in "attention" apart from the mental attitude, is the action of the tensor tympani muscle, which accommodates the membrane to the reception of the particular sound being listened to.

The muscles will also prepare the membrane for the reception of loud sounds, especially of low tone, which otherwise might produce damage to its delicate structure. Such sounds may rupture the membrane.*

Hygiene of the Ear. The ear is a most delicate organ. Its essential part, the labyrinth, is well protected from violence by the solid bone in which it is placed, but disease may attack it, leading to defect or loss of hearing. A large proportion of the deaf owe their deafness to this cause, or to failure in the development of this part of the organ. Other cases are due to injury or disease of the drum occurring early in life before speech is acquired or established. Interference with the organ, except by those skilled in aural surgery, is at all times dangerous, even when hearing is absolutely lost, for inflammation is easily excited and damage to the brain with serious danger to life may result. No instrument should be inserted into the meatus for any purpose, and even so simple an operation as syringing to remove wax should be performed by a medical man. If water effect an entrance into the meatus its complete removal is highly desirable, for in the first place the presence of a few drops of water on the tympanic membrane interferes considerably with its power of transmitting sound, and it may also be the means of setting up mischief in the middle ear. It should be allowed to run out by holding the head with the ear dependent and gently patting with a towel over the external ear. Discharge from the meatus, pain in the ear, or slight loss of hearing are conditions which should always receive medical advice *early*. Deafness can be averted frequently by early treatment of affections, which if neglected, get beyond all recovery. In no case should a plug of cotton wool be inserted in the meatus when discharge, however little, is flowing from it. A box on the ears may also, in diseased conditions, cause fatal consequences.

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* Mr. Arnold in the original edition of this work makes the following quotation in regard to the membrana tympani :—"It is so constructed as to answer equally well to any tone from 40 to 40,000. This property is communicated in a twofold form, first by its funnel shape, by which it is unequally or slightly stretched, and second, by being sustained by the ear-bones. It has therefore no fundamental tone, and can transmit waves of different degrees of rapidity with equal ease." "And another important effect produced by this funnel shaped membrane must be mentioned. The apex of the funnel bulges inwards, and the point of greatest vibration cannot be at the margin, but at the apex or some intermediate point between the apex and the margin. But as the force of the vibrations passes from all sides towards the centre, the vibrations at this point are at their greatest intensity, and their force sets the ear-bones in motion." (p. 274, 1st edit.)

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FIGURE 19.

FIG. 19.

SECTION OF THE SIDE WALLS OF THE SKULL TO SHOW THE PARTS OF THE EAR.

a, the semicircular canals; *b*, external auditory meatus; *c*, tympanic membrane; *d*, one of the ligaments of the malleus; *e*, cochlea; *f*, concha or external ear; *h*, by the mastoid cells of the temporal bone; *i*, eustachian tube; *k*, apex of the petrous bone; *l*, placed on the vestibule of the labyrinth near the fenestra ovalis; *m*, incus; *n*, malleus; *s*, styloid process.

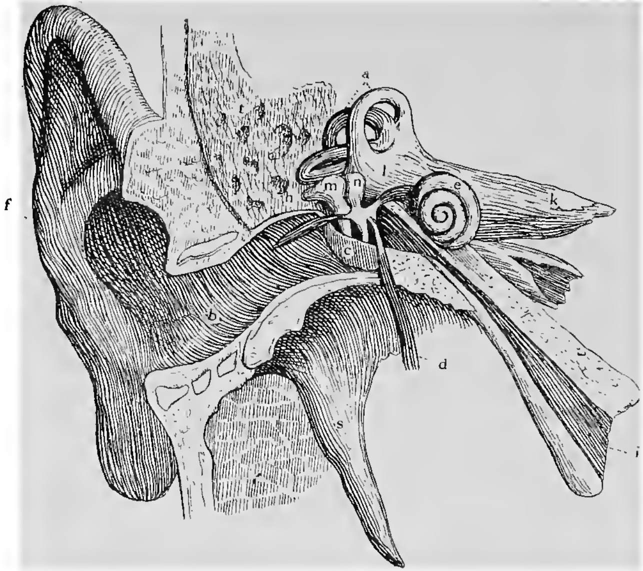

Fig. 19.

FIGURES 20 and 21.

FIG. 20.

THE OSSICLES OF THE MIDDLE EAR *(magnified).*

The parts of the malleus are lettered *M*; those of the incus *I*; and those of the Stapes *S*.

Mc, capitulum or head of the malleus; *Mn*, its neck; *Ml*, the processus gracilis, or slender process; *Mm*, the manubrium or handle.

Ib, body of the incus; *Is*, its short, *Il*, its long process; *Io*, orbicular process.

Sa, arch of the stapes; *Sb*, its base; *Scr*, the crura or legs; *Sh*, the head.

FIG. 21.

VIEW OF THE LEFT TYMPANIC MEMBRANE AND OSSICLES FROM THR INNER SIDE *(magnified).*

m, malleus; *i*, incus; *s*, stapes; *d*, pyramid, from which the tendon of the stapedius muscle is seen emerging; *o*, tendon of the tensor tympani cut short near its insertion; *p*, handle of the malleus; *a*, superior ligament of the malleus; *b*, ligament of the incus; *c*, anterior ligament of the malleus; *x*, chorda tympani nerve passing across the outer wall of the tympanum.

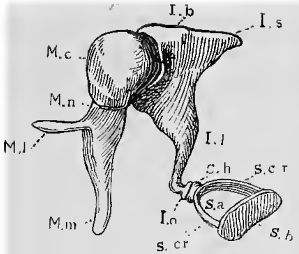

Fig. 20.

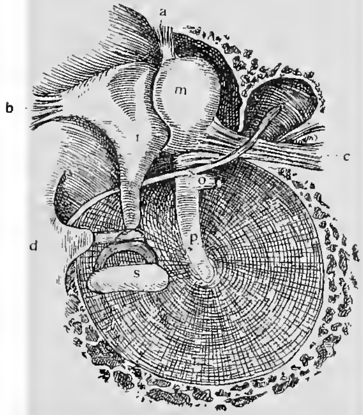

Fig. 21.

FIGURES 22 and 23.

FIG. 22.

VIEW OF THE INTERIOR OF THE LEFT LABYRINTH.

The bony wall of the labyrinth is removed superiorly and externally. The membranous canal is left in the upper semicircular canal, to show the manner in which the membranous labyrinth lies in the bony case. *d*, common opening of the superior and posterior semicircular canals, *a*, *b*; *c*, horizontal or external canal; *e*, spiral tube of the cochlea (scala tympani); *f*, scala vestibuli; *g*, opening of the aqueduct of the cochlea; *h*, opening of the aqueduct of the vestibule; *i*, fovea hemielliptica; *k*, ampulla of the superior semicircular canal; *l*, cochlea; *o*, fovea hemispherica.

FIG. 23.

VERTICAL SECTION THROUGH THE COCHLEA.

Cn, cochlear nerve; *m*, modiolus or central column; *i*, *i*, lamina spiralis; *o*, scala tympani; *u*, scala media; *e*, scala vestibuli.

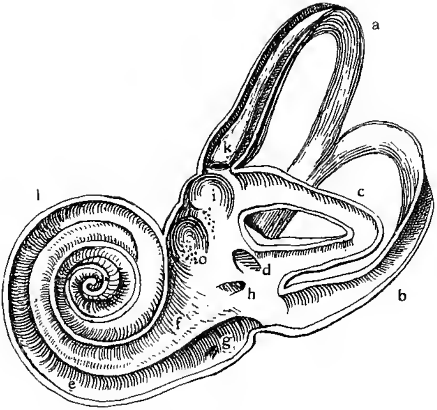

Fig. 22.

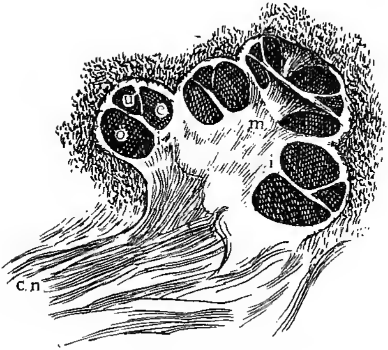

Fig. 23.

CHAPTER III.—PHYSIOLOGICAL PHONETICS.

SECTION I.—LIP-READING.

Before proceeding to deal with the elements of speech and their mode of production, it will be desirable to explain the process of reading the speech of others, commonly called *Lip-reading*. As a term, it is misleading, for other parts of the mouth and face participate in the muscular action on the effects of which the reading of speech is founded. The lips are undoubtedly the most active, visible and expressive parts in speech as seen by the deaf, but they are not the only ones, the teeth, tongue, jaws, cheeks and nose also contributing their share towards the general effect, which is facial rather than labial. In strictness the process would be more correctly described as *speech-reading*, but as the other term has long been the accepted one, we shall conform to custom and retain it.

The assumption on which lip-reading is founded is that the effects of the action of the organs in speaking are sufficiently indicated on the face to enable those who make a study of them to find out what is spoken, independently of hearing. This assumption does not imply that these visible indications have much resemblance to, far less reveal, the organic positions and motions in the production of the sounds, but only that they are sufficiently distinctive and apparent to form a facial alphabet or syllabary of the respective sounds, so that they can be read as the same sounds are by the written alphabet.

The difference between them is that in lip-reading rapid movements, in writing or print fixed characters, are the signs of speech.

As speech on its mechanical side is due to muscular action it is certain that some indications of its presence would be apparent in the participating movements of the parts indirectly affected by it. This is clearly the case with those sounds—labial and dental—which depend chiefly on the movements of the teeth and lips, but there are some others, chiefly the guttural and palatal, in whose utterance very little if any visible indication of the action can be seen. It is asserted by many that this is enough to render the assumption futile, and to reduce lip-reading to a mere piece of clever guesswork, eked out by a few visible facial characters. Such a charge is entirely negatived by the universal experience of all the orally taught deaf. The invisibility of the action of some of the sounds does not militate against the practicability of lip-reading, for it does not depend solely on the visibility of sounds considered singly, but can be shown to be a strictly scientific process depending on certain conditions which we will now state.

1. Although the action of some sounds may be invisible in their inception, or even as a whole, their association with others in which it is better seen will usually at once suggest them, and enable the lip-reader to supply them as if the whole action were apparent. In other words, lip-reading does not depend on the individual phonetic elements as units of speech but on the syllable only, which combining two or more elements, gives rise to varied muscular movements, whose effects are better observed and remembered. If *p*, *pa*, and *pat* are compared in this aspect they will be seen to differ materially.

2. But syllables are not all made up of one or two consonants and one vowel. Many have two initial or two final consonants, or both, and some have three in either place ; the result being that the muscular action required in their articulation is such as to give rise to still more varied and well marked facial indications. This is very apparent in such examples as *span, flame, blow, bolt, bark, place, train, bran, drab, sphere, slept, born, earl, branch,* in which the lips, cheeks, jaws, teeth and tongue are all engaged in complex lines of movement.

3. A large number of words are formed of two or more syllables, which are pronounced together—except where the accent introduces a marked pause—leading to still greater muscular action, in which the stronger and more conspicuous elements are united with the

weaker and less conspicuous. The former are easily seen and suffice for the lip-reading of the whole word.

4. Similarly phrases and sentences are made up of stronger and weaker parts, or of strongly contrasted parts, and when often used, as in the language of daily life, the eye becomes familiar with their facial forms, which are freely read off from the rapid mental supply of the associated sounds.

5. Lip-reading does not consist in the mere reading of a set of arbitrary facial signs having no relation to anything else. The deaf person, as he reads the face of another, mentally converts what he sees into the organic action by which the sound or sounds are produced, so much so that he often repeats to himself what he sees the other saying. The forms of lip-reading being the direct outcome of speech, their association is thus natural, and as real and intuitive as is that of sounds with spoken language in the case of those who hear, and the ideas expressed appear to have more vitality than when conveyed in the more indirect and external forms of writing or manual spelling.

It is now evident that there is a method in seeing the movements of the lips of a speaker, or rather of his face as a whole, and further that the labour is lightened by habit and economy of effort, and the process is to some extent capable of description. First the deaf scholar obtains a mental picture of, say, *f* or *th*, which has a definite facial character of its own. Next in associating several sounds in a syllable and a word, he merges their separate facial characters into a single whole peculiar to that syllable or word, and which may be described as the resultant of the separate facial characters that make up the word, but of which the lip-reader scarcely thinks the moment the word is read off. The same principle applies in the case of whole sentences, such as *Where have you been?* in which the rapid transitions from one marked position to another in *w, v, u, b*, are sufficient, from long familiarity, to suggest the sentence without suggesting the less definite movements between, although their presence is all the time essential. That habit and association have much to do with this is evident from the fact that such rapid lip-reading would be of little use in the case of a strange language.

Thus with constant practice, a large number of common words, phrases, and even short sentences, acquire a particular facial expression or "look" of their own, which renders the labour of reading their individual sounds unnecessary, just as in reading print we take in the words as wholes and not as spelling every letter. Frequently words are more easily read on the lips when spoken as a whole than if the syllables are separately pronounced. This explains why it is often possible to read rapid speech when the discrimination of all the facial movements would be impossible if the reading depended only on the perception of all its component parts. By an extension of the same principle, the context of a sentence will often be so suggestive that sometimes a deaf person will read off a long set narrative from the lips of an intimate, whom he may fail to understand at another time were a casual remark to be sprung unexpectedly on him.

Lip-reading, in fact, follows the same tendency, observable in other forms of expression, to reduce the complex to the simple or the whole to its most characteristic parts, and which, as we have seen, is especially marked in the language of signs. In its advanced form it may be defined as seeing a succession of facial pictures formed of the most expressive and conspicuous parts of the mechanism of speech—key syllables or words—which united become representative of the whole.

There is one important difference between speech and lip-reading as subjects of instruction. In teaching articulation the teacher has to rely chiefly on his own skill to make a good speaker of his scholar, but proficiency in lip-reading depends almost entirely on the scholar's own skill and quickness. To some extent his teacher can point out to him the lines along which lip-reading may best be developed, but it will be for the scholar to seize the most distinctive movements for his facial pictures of speech. Many of these depend on the anticipative action of the organs in the shifts from one position to another, especially in double consonants, but this action is of too slight a kind to be described. A few practical hints on the subject may be useful.

1. Lip-reading must be specially taught as well as speech, for it is not quite correct to assume that because speech itself is learnt by lip-reading, the latter will be learnt at the same time. No doubt it would to some extent, but not with the intelligence and accuracy which result from constantly directing the attention of the learner to the visible effects of the special muscular action of each element of speech as it is taught.

2. Some teachers favour the plan of speaking to the deaf as soon as possible, independently of later instruction in speech. No doubt familiarity with the motions of the lips may lead to a knowledge of some of the simpler words, but it is doubtful whether in the end much is gained thereby. Lip-reading has its natural basis in speech, and to practise the former before or apart from the latter is to reduce it to a set of mere signs, lacking the intuitive character which pertains to it from the facial movements being read as the effects of the articulatory movements of speech. Besides, there is a danger of the scholar forming erroneous ideas of the facial movements, which will afterwards be difficult to eradicate when speech is taught. Lip-reading and speech depend on each other, and to divorce them is both unnatural and unnecessary. At the same time, imperfect speech need not hinder lip-reading, and in many oral classes a few of the scholars who are deficient in their speech are able to follow their teacher's lips throughout the course and keep as well to the fore as the others.

3. The eye of the learner should be directed to the different facial movements proper to each sound, proceeding from the easy to the difficult and from the simple to the complex, until it becomes familiar with

them; and, similarly, with all the movements associated with words, phrases and sentences, especially those of a colloquial character, the key words or syllables being particularly noted which serve to suggest the whole.

4. A course of exercises should be devised as a drill in lip-reading. A number of sentences might be pronounced first clearly and slowly, with intervals between the words, and then rapidly and in close succession in order to test the capacity of the scholars and ascertain what was specially seen by each that suggested the whole.

5. The teacher should avoid "mouthing" his words, *i.e.*, pronouncing them in a needlessly exaggerated manner. They should be distinctly and slowly uttered, so that all the movements may be clearly seen, but this should later on give place to the more natural and ordinary mode of utterance, without however losing in distinctness.

6 The visual similarity of many sounds in regard to their organic positions, as in *p*, *b* and *m*, *f* and *v*, *t* and *d*, *n* and *l*, extending to words, as, *pan*, *ban*, *man*, *fan*, *van*, etc., which have been named *homophenes*, is a difficulty that seems at first insurmountable. There are slight differences in the mode in which the lips, teeth, etc., are adjusted for such sounds, which the teacher can point out to the scholar, but in ordinary practice homophenous words are determined by their context, as when we say "that *man* is under the *ban* of the Church"; "a *man* is frying bacon in the *pan*." It will be excellent practice to have a set of exercises in lip-reading which included a large number of such words, but not until after the scholar is thoroughly acquainted with the differences in the manner of articulation due to *p* being an air stop, *b* a voice stop, and *m* a semi-vowel, etc.

7. The teacher should thoroughly understand the principle of the more marked and definite movements suggesting the less so, carry it out in the relations of syllables, words and sentences, and rely on the scholar's own ingenuity and knack to turn them to the best advantage in lip-reading. It is in accordance with this

principle that short words are not necessarily the easiest to read; on the contrary many long ones, from the greater variety of muscular action involved in their pronunciation, are easier to read off. Hence a large acquaintance with the language will greatly aid in lip-reading not only such words but also homophenous ones.

We have spoken of lip-reading as being a scientific process, but it need hardly be said that this does not imply that it is a perfect substitute for hearing, or even for manual spelling. Hearing is almost entirely independent of the personality of the speaker,—one could understand fifty people each speaking in the dark—but in lip-reading almost everything depends on how a speaker speaks to a deaf person—in fact, on what in this connection we may call the personal equation. A deaf person may understand another so perfectly as to appear to hear him, and yet entirely fail with some one else. We have already dealt with this aspect of the subject, and so will only observe here, that while admitting the limited and uncertain application of lip-reading, at any rate outside the school and home, such a fact is no valid objection to lip-reading *per se*, since those who have acquired it can, when necessary, use the same means of writing and manual spelling as those taught by silent methods, who, nevertheless, have not the advantage of lip-reading in addition.

Analysis of Lip-reading. Each description of the mode in which a sound is articulated (in Sect. III.) is followed by one of its "reading" on the lips and face. It may be as well to point out to the teacher, that these "readings," including as they do so much minute detail of a kind hardly, if ever, observed by the deaf scholar in ordinary lip-reading, should be taken more as being for his—the teacher's—own information in explaining the *exact* movements and muscular action on which the *broad* effects usually observed depend, than as intended for the scholar's practical use. It is therefore not advisable in the early stages for the teacher to lay too much stress on these *minutiæ* of lip-reading, especially where the muscular action is concerned. Arnold in the original edition concludes this account of lip-reading with the following useful observation, "There is one movement which calls for special attention, that of the lower jaw. This is known to recede or advance in compliance with the action of the tongue. When guttural sounds are articulated it falls back, and when labials it advances. These changes are indicated by the lips and teeth in their relation to one another, for when the sounds are guttural the upper teeth and lip are in advance of the lower, but when labial or dental they are almost on the same vertical line."

SECTION II.—SOME MECHANICAL AND DYNAMICAL PRINCIPLES OF ARTICULATION.

Continuity of Vocal Sounds. When a note of a given pitch is blown on a small organ pipe, the pitch remains the same from first to last, while the intensity may vary. This uniformity follows the structure and material, which are uniform and fixed, so that every sound passing through is subject to the same modifying conditions. But not so with the vocal cavity, beginning in the larynx. Although forming a tube, it can be so acted upon by the muscular action of the various organs of speech, and is so elastic in material and structure, as to be capable of great variations in length and diameter, so that it is rather a series of tubes of considerable compass capable of modifying the tone. Being neither stationary nor rigid, but capable of many voluntary shifts and adaptations, the vocal organs are themselves also subject to great variations in adapting themselves to the requirements of tone, pitch and intensity, so that none of the notes are uniform, like those of an organ pipe, but usually begin and end on a different pitch, or glide through several notes from organic shifts or relaxations. Musical instruments have been constructed to imitate the human voice in their tones, but never with this power of blending and yielding to the will. In the voice, every emotion and form of thought finds such expression, that it seems more mental than material.

Mechanical Action of the Vocal Organs. I. The action of the organs of speech being muscular or mechanical, can to some extent be reduced to mathematical expressions. It is enough for our purpose to say that a series of straight lines, curves, angles, are formed by them in the production and union of sounds.

(1.) With respect to the vocal cords, they open, close, contract, or dilate in response to all the requirements of vowel sounds. The laryngoscope reveals these movements, which are uniform in uttering the same notes.

(2.) The larynx rises or sinks from muscular action in response to the requirements of the vocal cords and the extent of the vocal tube.

(3.) The lower jaw, provided with suitable joints and under the control of its muscles, is capable of a fourfold set of movements. Starting from the point of its usual contact with the upper jaw it can descend, advance, retreat, move to either side, and therefore co-operate with the lips, teeth, tongue and larynx in the formation of all the sounds. These motions ought to receive great attention, for they have much to do with effective articulation.

(4.) The lips, from their great mobility, can produce a variety of movements, as in protusion, withdrawal, rounding, contracting, elongating, etc., with which we ought to make our scholars acquainted.

(5.) The cheeks, too, can be expanded and contracted, advanced or withdrawn by the action of the under-jaw, as well as by their own muscles, by means of which the vocal tube may be increased or diminished.

(6.) The tongue, though fixed at its root, can take any shape or position within the mouth, pressing lightly or forcefully, or protrude beyond it. Yet all its action, being muscular, is mechanical and capable of expression by lines.

(7.) The nasal cavities, by the action of the *velum palati*, provide an alternative vocal tube for the nasal sounds.

By these mechanical contrivances and motions the vocal tube can be (1) lengthened by depressing the larynx and protruding the lips, the increase in length being about 1¼ inches; or (2) shortened, by elevating the larynx, drawing back the under-jaw, and drawing the lips close to the incisor teeth. The difference between these extremes is 1$\frac{19}{20}$ inches. These movements are effected in pronouncing *a̤* and *ē* respectively.

II. The action of the jaw, lips, and tongue modifies the form and size of the vocal tube very considerably, and permits the variety of the vowel sounds.

(1.) When at its greatest extent, by the opening of the mouth, the close pressure of the tongue on its bed and the larynx at its lowest point, the fundamental note *ä* is heard. But the full resonance of all parts of the tube makes the sound somewhat guttural.

(2.) But when the jaw rises towards the upper incisors, the tongue very near to the palate, the larynx raised, and the vocal cords approximated, so as to reduce the vocal tube to very narrow dimensions, while it is shortened at the same time, *ē*, our highest vowel sound, is heard.

(3.) If the posterior part of the tongue is drawn near to the palate, and a free space left for the voice with a corresponding rise of the larynx, *ū* is formed. In both these palatal vowels there is a decrease of the resonating surface.

III. But there are other conditions by which the vowel sounds are affected, viz. :—

(1.) The perfect formation of the whole cavity.

(2.) The elevation or depression of the larynx. While it is possible to pronounce, after a fashion, all the vowel sounds without elevating the larynx it is not the natural order. Accordingly it has been determined that the larynx shall ascend and the vocal cords contract with ascending vowel sounds.

(3.) The conformation of the mouth. This varies much, and hence differences of pitch and timbre. Thus the conditions on which the utterance of the clearest sounds depend are :—

For *ä*, a large orifice in the cavity of the mouth.

For *ĭ*, the lips drawn close to the incisors.

For *ū*, the vocal tube flattened, as in the protusion of the lips and depression of the larynx.

These are the principal mechanical conditions of articulation, but they are seldom available in the untrained deaf. This is easily accounted for, if it is remembered that the use of the organs in speaking is special and artificial. Guided by the ear the sounds are imitated as spoken by others, and in the process the organs take up the positions, but not without considerable effort in their articulation. Of this a child can give no account, yet it is brought about as efficiently through inevitable tendencies and laws as the use of the feet or the hands. But as the special use of the organs of speech is unknown to the deaf, they have not acquired their command and the habits on which the utterance of the clearest sounds depends. The muscular power over the tongue, lips and jaw is not developed, except in the reception of food, which is much less than in speaking. The scholar may open his mouth wide, but the extent of the cavity is small because the tongue is allowed to take up too much of the space, when it ought to be close down in its bed. The lips are either not protruded, or widened, or drawn close to the teeth; for they are not accustomed to such efforts. The cheeks are not pressed close enough to the molars for a similar reason. The conditions, therefore, do not exist, and till they are secured the clear pronunciation of the sounds cannot be secured.

All that the teacher requires is to be able to control the larynx, jaw, cheeks and lips, so as to train them for clear speech. The tongue is his great difficulty, for it is both seemingly in the way and deficient in the conscious control possessed by all who hear. Anyone may satisfy himself, in a few moments' trial and reflection, that in the pronunciation of certain sounds, as *ä*, *a̤*, he is in the habit of pressing down his tongue, especially at its base, to leave the cavity above it as open as possible for the vowel sounds. This is unknown to the deaf, but must be artificially learned. The finger, spatel or tongue-presser used by medical men are resorted to for this purpose; but the finger is the best, for it can be used freely and at the points where it is most needed. It is not enough if at first the scholar seems to keep his tongue in the right place. He will fail again and again, as he lacks the sense-consciousness or intuition. Better therefore to begin at once so that the habit may be formed.

Dynamical Principles of Articulation. (1.) Voice is a form of vibration, and therefore an effect of force. This force is generated in the lungs by setting in motion the air contained in them by the action of the respiratory muscles.

(2.) The air involuntarily expired from the lungs produces no vocal effects, but is heard in breathing only. This is called the indifferent state of the vocal organs.

(3.) The air is made sonant by the voluntary action of the glottis.

(4.) In escaping from the glottis the sonant air, before leaving the vocal tube, is modified into a number of different sounds or elements of speech.

(5.) When air alone passes through the vocal tube and the organs have the same positions as when it is sonant, it is also modified in a similar manner, so that the sounds can be read as if sonant. This is called "whispering," and shows how much is done by the other organs, apart from the glottis. But the larynx participates in this whispering.

(6.) Voice, as heard, is made up of the fundamental tone intensified by the harmonics formed in the vocal tube by its extent and resonant properties. The tube can be varied in length and diameter so as to produce a limited scale of notes with different degrees of resonance. These notes are heard in the vowel sounds and some of the consonants.

(7.) Much of the action of the vocal organs can be either seen or felt by the deaf, by the movements of the chest, the rushing of the air, the vibrations of the glottis and other organs, by their positions and by their muscular action in shifting from one position to another ; hence they can be imitated.

(8.) As the outward muscular action in speech is not confined to the lips only, but more or less employs most of the facial muscles, the eye of the learner can be educated to regard their effects as a whole as well as the parts principally affected.

(9.) As speech is voluntary, and dependent for its excellency on the control possessed by the learner over all the organs employed in its production, all his exercises ought to be conducted with this object in view. Those already described would do much, yet not all that is required. Long and short respirations, so regulated that the air is expelled at a single impulse or slowly—a small quantity escaping alternately with a larger—will prepare the way for the proper control of the breath, economize force and secure greater facility in speaking.

(10.) Each vowel, when naturally pronounced, has its own pitch. From *ä* up to *ē*, five distinct sounds with their harmonics are heard. Three classes of muscular action are successively employed in their production. In the fundamental tone, the larynx is depressed and the vocal tube extended in length and capacity, while the vocal cords are relaxed to secure the right number of vibrations per second. Thus there is an arrangement of all the parts of the organ for the production of this vowel sound. But if *ā* is required, then there is a slight rise of the larynx, a partial closing of the vocal tube by a corresponding rise of the jaw and tongue, so that it is reduced in compass while the vocal cords are drawn closer for the production of the higher pitched note. But now let *ē* be pronounced, the larynx has risen much higher, the jaw and tongue have drawn nearer to the palate, and the vocal cords are much closer for this vowel of highest pitch. This can be made evident to touch, and thus be understood by our scholars, so that they are provided with the suggestions to a similar use of their own organs.

Formally expressed, these facts show firstly, that there is a simultaneous action of all the organs of speech in the production of the vowels, and many of the consonants, peculiar to each; and secondly, that the variations in tone, accent, and cadence, are dependent on this action, and therefore the deaf ought to be assisted by touch and sight to employ their organs in a similar manner to secure the same ends.

The complaint is often made that their voices are monotonous. The reason is that they do not shift the organs into the positions of the different sounds, but try to make them all on the fundamental note. If this is counteracted by the raising and lowering of the larynx, touch will discover the difference. Our ear unconsciously aids us to all this; another sense must take its place in the deaf.

(11.) When performing on a wind instrument it is found that there is a definite proportion between the form, the direction, and the tension of the current of air and the sonorous capacity of the instrument; and only when this proportion, or the equilibrium between the force of the air and the harmonious vibrations, is obtained is the right sound evoked. This sound is at once the simplest, the easiest for the muscles of the performer, and the most pleasing to the ear. So with the vocal organs. The quantity and tension of the air for speech must be in equilibrium with the capacity of the vocal cords to convert it into pure sound, free from strain or feebleness. The ear perceives this, but from the absence of hearing the deaf-mute generally errs, from either excess or deficiency of muscular force, so that the voice is either strained or feeble. He ought, therefore, to be led by a number of well-directed trials to produce the right tone; for, when this is attained, he will himself begin to feel that it is the smoothest and easiest for his organs. The vibrations of a pure note are equal and harmonious, but those of a noise broken and harsh. The fundamental sense-relation of touch to sound enables the deaf to perceive to some extent these differences and manifest their pleasure or dislike accordingly.

If a finger is placed on the hollow of the thyroid cartilage above Adam's apple, and a gentle downward pressure is exerted, then it will be found that the vowel sound pronounced in these conditions is lower according to the pressure. By such means a falsetto voice may be gradually brought down to the ordinary pitch.

(12.) It is a well known fact that all organs are unequal to the discharge of their functions when they have not been employed for a long time. The muscles and nerves are especially subject to this decrease of power, and it is also known that this cannot be restored without much exercise. But as the vocal organs of the congenitally deaf have never discharged their special functions, it is very plain that their primary efforts to produce vocal sounds must be very defective both in execution and in the discriminating touch which would determine their correct form. Nothing but thorough training can overcome this deficiency.

(13.) The force required in producing full vowel sounds is also sufficient to produce associated consonants without a fresh impulse. But should the organs be imperfectly adjusted, say in *s*, *sh*, *b*, *d*, etc., then an additional impulse is required to make it audible. This is a dangerous defect, and its correction can be best made by placing the organs in the right positions. The habits of speech in us who hear have established the proportions of force required by these combinations. The deaf can only attain to them by practice aided by touch. If wrong positions of the organs are allowed to pass the sounds will at first be feeble, and afterwards omitted altogether. But once the correct sounds are secured they will be best remembered.

Again, when a word or syllable begins with a single or double consonant the force exerted in its production ought to be that required by the following vowel as well, so that no fresh impulse is necessary. But when a number of syllables have to follow in rapid succession, then it ought to be seen to that the volume of air in the lungs is equal to the demands of the energy required in pronouncing them as a whole, so that there is no falling off in force from exhaustion. The exercises already learned are useful here, but they are not so good as graduated lessons beginning with one syllable and advancing to many, for the expenditure of air in single syllables differs much from what it is in continuous expulsion.

(14.) The modifications of vowel sounds, as will be more fully evinced in our detailed description of those used in our language, are endless, from the changes which can be made in the positions of the organs and the resonating capacity of the vocal cavity. But they are simply modifications of the principal vowels, arising from their relations to consonants or to one another; for the shifts which follow from the positions required by the first to those of the second or third may be considerable, and still the voice is escaping and glides rapidly through the intervening full and partial tones till the last is reached. Let *da* illustrate this. Here *d* is formed by the tongue arresting the voice by pressing against the palate, but to arrive at *a* the organs have to shift to the position required for the vowel by dropping the jaw, lowering the tongue into its couch and opening the mouth, but in doing so the voice glides over the intervening vowels. The effect is similar to that which is heard on a violin when the finger only is shifted and the bowing continued. This modification of the vowel from transition is a considerable factor, and must be taken into account.

(15.) As the consonants have no independent value as sounds apart from the vowels, neither syllable nor word can be formed of consonants alone. They are only the organic expedients by which a few vowel sounds are varied, in order to meet all the demands of speech. Apart from vowels there is no intelligible explanation of them. Max Müller, in his *Science of Thought*, says, "They have, in fact, no real independent existence, they are nothing but the inventions of grammarians, and their combination would only give rise to meaningless sounds, never to significant roots." This being their nature and value, their place is with the vowels, and the manner in which these are modified ought to be carefully noted; for it is found that the vowel has to yield to the new conditions imposed on it by the initial or final consonant with which it is united, both in the positions of the organs and in the character of the sound. While, then, we should seek to secure the correct articulation of every consonant, it ought to be done solely with a view to its more perfect articulation in union with vowels, or, rather, that the vowel modifications effected by it may be as distinct as possible. Some teachers never separate them, but many more teach them apart, being convinced by experience that, owing to the absence of the guiding and correcting ear, the learner is left in great uncertainty as to the exact phonetic value of the consonants, and that this can only be obviated by learning them apart.

Let the syllables *pa*, *ta*, *ka*, be taken as illustrations. In *pa* the initial consonant *p* is formed by pressing the lips firmly together, which leads to their slight protusion. Now this position is very favourable to the full and free pronunciation of *a*, for the jaw has only to drop to the position required by it, and no other organ is called into action in the sound but the glottis. Ease and facility characterize this syllable in its muscular action.

Again, in *ta*, *t*, as the initial consonant, is formed by pressing the apex of the tongue against the hard palate, but to facilitate this action the jaw has first to retreat somewhat to accommodate the tongue in its backward movement to secure the requisite muscular pressure by its apex on the gum. The altered relations of the teeth prove that this movement has taken place. What then is the result in regard to the *a* with which it is combined? Does the jaw return to the same position as in *pa*? No; it retains the position it took up for *t*, and simply drops for the *a*, and hence the vowel is modified by the tongue and the shorter vocal tube. This action tends to muscular ease and facility.

But in *ka* this is still more evident, for *k* being guttural the jaw retreats still more for the accommodation of the tongue on the soft palate, and there is no attempt to advance it to the *pa* or *ta* place, but *a* is pronounced in the guttural position, and hence is guttural also. Thus in each syllable there is a modification of the vowel, determined by the position of the initiatory consonant both for ease and facility in its pronunciation.

The same law is found to hold good when the consonant is final and the vowel initial, for in order that the consonant may be pronounced with ease the organs anticipate its articulation by taking up the guttural position, and therefore in *ap*, *at*, *ak*, the jaw moves into the position for each before the vowel is pronounced. The vowel is thus modified by the final consonant for muscular facility. An attempt to pronounce *a* in the *pa* place after *t* or *k* would show how great is this accommodating muscular action.

To some these distinctions may seem trivial and of little practical use; but not so, for if admitted they must considerably influence our arrangement of the elements of speech in teaching.

If Nature is ruled in her action by this law of greater ease or facility when she teaches the elements of speech to hearing children, should we not endeavour to follow her example with the deaf? Should the *a* in *ta* or *ka* be taught before the *t* and *k*, or reserved till the initial consonant determines it according to the law? Evidently the latter, for as the vowel is modified by the consonant with which it is conjoined, the modifier ought to precede the modified. But this law applies to all similar consonant and vowel combinations, and ought to determine the arrangement of the phonetic elements.

Again, the positions of the organs in the articulation of the consonants are modified by the vowels which follow or precede them. The cause is evident, for Nature strives to reduce the distance by bringing the sounds as near together as is convenient for muscular effort and ease. If *p* is united with *ä*, *ā*, *ō*, *ū* and *ē*, it will be perceived that in *pä* the lips are in their normal position; but, as we advance to *pā*, *pō*, *pū* and *pē*, they gradually rise, because the jaw rises, till in *ē* they approach the nose. Hence it may be safely affirmed:

1. That the consonants modify the vowels with which they are associated, in position, tone, inception and termination.

2. That the positions of the organs in articulating the consonants are influenced by those of the vowels which precede or follow them.

3. That the organs of speech are always endeavouring to minimise muscular effort in combining sounds for the sake of ease, or, as in mechanics, to economise force and avoid undue friction.

4. That the action of the organs of speech is easy or difficult, simple or complex, according to their relative positions and the muscular energy required in shifting them.

(16.) Sounds formed in the anterior of the mouth are easier to the learner than those formed in the posterior, for there is not only more space for the free action of the vocal organs, but also more employment for both sight and touch.

(17.) Many consonant combinations would be most difficult to pronounce, from the muscular effort required in passing so quickly from one to another so as to prevent the intervention of a vowel. But Nature has an expedient which avoids this danger. This may be termed *anticipative organic action.* In the union of *b* and *l*, as in *blow*, the tongue does not wait for the completion of *b*, but rises and advances to the *l* place; so that it is almost in the position to begin *l* immediately on the completion of *b*. Even in the very difficult union of *g* and *l* the tip of the tongue turns towards the palate while its base is delivering *g*. The learner can be made aware of these movements by directing him in *bl* first to raise his tongue towards the *l* place and keep it there till he has articulated *b* with his lips.

But if each element in such combinations is not well learned, their union is certain to increase the imperfection of articulation, and a hybrid, understood by none and unknown to the language, takes the place of the true sound. Exercises in which they are first pronounced apart, with a pause between, which is gradually lessened till they coalesce, are the most effective to secure their exact articulation.

Defects of the Voice.—M. Goguillot in his *Comment on fait parler les Sourds-Muets* draws special attention to certain defects of the voice which may be looked for in the course of articulation teaching. They are:—

1. Excess of voice—shrillness—which may be accompanied by needless facial contortions. 2. Insufficiency of voice, due to want of vigour and suppleness in the organs. 3. A falsetto voice—*voix de tête*. M. Goguillot deals at some length with this: "in order to obviate it, we should try to bring back the thoracic vibrations which characterize the natural chest voice, and prevent the tongue from moving behind." 4. A too low voice—grunting. 5. A guttural voice. 6. A nasal or snuffling voice—one of the commonest defects.

Generally speaking, apart from special means, touch plays a large part in the correction of these defects.

SECTION III.—THE ELEMENTS OF SPEECH.

Classification. No attempt will be made here to scientifically analyse and classify all the sounds of our language. To do so would open up a very wide subject as to which the authorities are by no means agreed. Most modern analyses treat the speech-sounds to a great extent independently of language and its written alphabet, and no practical object would be served by adverting to them. It will be quite enough for our purpose to explain and use the ordinary terms employed in the classification of the sounds represented by our written alphabet, with some of the more important combinations of letters represented by single sounds.

Speech-sounds are divided into *vowels* and *consonants*.

I. The vowels *a*, *e*, *i*, *o*, *u*, as such stand by themselves, and are either *long* or *short*. With them may be classed *y* when pronounced as a vowel, and the *diphthongs* ai (fail), ao (gaol), au (caught), ea (beat), ei (either), eo (people), eu (feud), ie (tied), oa (foal), oe (toed), oi (foil), ou (pound), ua (guard), ui (build), uo (buoy), which are practically single vowel sounds, although phonetically in many cases the sound of one vowel may be heard more or less along with the other.

II. The consonants are classified in various ways, but some classes are not very sharply defined.

1. As *voiced*, *sonant*; or *breath*, *voiceless*, *non-sonant* and *surd*. The former include b, d, g, j, l, m, n (ng),

r, v, w, y, z (zh), th (this); and the latter c (s and k), f (ph, final gh), h, k (ch), p, s (sh), t, x = ks, th (thin), ch (church), wh.

2. According to their characteristic organic position in articulation: *labials*, b, p, m; *dentals*, f (ph, final gh), v, th; *palatals*, d, t, j, ch (church); *gutturals*, k (c, ch), g, ch (loch); *trill*, r.

3. According to the mode in which the breath or voice is arrested or expelled: *voice stops*, b, d, g; *breath stops*, p, t, k; *liquids* or *semi-vowels*, l, m, n (ng), r (an elastic class which may include a few others); *sibilants*, s (c, sh), z (zh), ch; *open*, f, v, s (sh), z (zh), y, h, th, w, wh; *fricatives* include the dentals and sibilants; *aspirates* are the open sounds which are breathed only, in which *ch* may be included. *Q* alone cannot be classified, being formed of a breath and a voice consonant *kw*.

Diacritic Marks. As is well known, our alphabet of twenty-six letters does not correspond to the phonetic one in actual use. This undoubtedly adds to the time and labour spent by the deaf in learning to spell and pronounce words, and at first appears to be much greater than with those who hear. This, however, is more apparent than real, for there is no valid reason why the deaf should not, despite the anomalies of our alphabet, meet its difficulties as well as the hearing do, through trained habit and use. Moreover, not having to depend on the ear alone, they as a rule spell more correctly.

Still, anything that will lessen the difficulties occasioned by the want of a truly phonetic alphabet is worth consideration, provided it does not defeat its own end. According to a great authority, A. J. Ellis, no one language has more than fifty distinct sounds, and practically fewer still are needed. As might be expected of a class of sounds so variable as vowels, the number of those sounds for which our five symbols have to do duty is large, but as many of them are the inevitable effects of consonantal modification, the number of those distinct enough to be independent of this is comparatively small. While many of the consonants are truly phonetic, as *f*, *b*, *m*, etc., others as *c*=*s*, *c*=*k*, *g*=*j*, *ph*=*f*, are superfluous, or, what is the same thing, have to do duty for other sounds; some double consonants with a single sound have no proper symbol of their own, as *th*, *ch*, *sh*, etc.; and some double sounds are represented by one, as, *x*=*ks*, *q*=*kw*. Diphthongs are another anomaly.

Of the various expedients that have been contrived for representing the speech-sounds by a set of symbols corresponding to their phonetic character, Melville Bell's Visible Speech, described in the Historical Sketch, is the principal. There is, however, the fatal objection to this and all other similar schemes, that far from displacing the ordinary alphabet, it introduces a new set of symbols between this and the phonetic alphabet, so that notwithstanding some apparent facility of reference in learning the sounds, nothing is in the end gained, and some system of diacritic marks by which the pronunciation of words in the ordinary alphabet, according to the Visible Speech or any other scheme, could be ascertained, becomes a necessity. In fact, Ellis says of it that "it requires much explanation to be intelligible, and after all tells but little." It may be taken as a general rule that anything of this kind which intervenes between our alphabet and the phonetic one, is unnecessary and distracting, because the deaf, being constantly under their teacher's guidance, can gradually learn the many modifications of sounds in our language and so adjust the two alphabets through ordinary use in the same manner as the hearing do.

Some teachers carry this rule so far as even to dispense with diacritic marks altogether, but there is no doubt that a moderate use of them to discriminate some of the more distinctive sounds, chiefly vowels, represented by a single symbol in our alphabet, would be helpful, while the rules and exceptions, such as *c*=*s* before *e* and *i*, and *c*=*k* before *a*, *o*, *u*, are soon remembered and practically applied. Many of the recent large dictionaries, following the scientific orthoepists, have very elaborate, not to say pedantic, analyses of the speech-sounds. This is particularly the case in Murray's great English Dictionary, whose system is so minute and artificial as to be practically useless from our standpoint. Scarcely any two dictionaries agree as to what sounds are to be discriminated and the marks to be used, but after a careful comparison, we are disposed to consider Ogilvie's "key" the most serviceable, as including the diacritic marks most commonly used on both sides of the Atlantic, and will therefore adopt it with the addition of ◡ to indicate the short sound of the vowels.

ā (*fate*)	ė (*her*)	ū (*tube*)
ä (*far*)	ī (*pine*)	ŭ (*tub*)
ă (*fat*)	ĭ (*pin*)	ü (*Sc. abune. Fr. u*)
a̤ (*fall*)	ō (*note*)	ṳ (*bull*)
ē (*me*)	ŏ (*not*)	oi (*oil*)
ĕ (*met*)	ö (*move*)	ou (*pound*)
th (*this*)	th (*thin*)	

Some of these are in practice hardly required, as *oi* and *ou*, and *ė* in *her*, where the *e* is really *ĕ* modified by the consonant, while *ö* and *ṳ* are little more than variations of *ū*. On the other hand there is nothing to indicate the sound of *i* = *ē*, as in *marine*, *machine*, *divide*; it may perhaps be indicated as *ï*. For those who understand the analogy of the vocal and air forms of *th* to *d* and *t*, the method employed by some of indicating them as dh and th respectively may be useful. Special note may also be taken of the useful but not general rule that when the final syllable of a word consists of two consonants with a vowel between ending in *e* mute, the vowel is long, and when without the *e*, short, as, *here*, *her*; *fine*, *fin*; *bare*, *bar*; *fire*, *fir*; *shame*, *sham*.

Those diacritic marks really needed should be boldly printed or written in large characters and placed where the scholars can readily see their teachers refer to them when giving instruction in articulation, it of course being assumed that the sounds thus represented are already familiar to them as elements of speech. Learners advanced enough for it will find Annandale's cheap *Concise English Dictionary* (Blackie, 1900), founded on Ogilvie's, excellent for reference in pronunciation, as the writer can testify from practical experience of the Student's Edition of Ogilvie.

The Order of Teaching. It is obvious that in teaching the deaf to articulate, we ought to begin with the simplest sounds and gradually advance to the more difficult. This is the manner of Nature with those who can hear. Under her guidance they begin with the simplest first, as *Papa* and *Mama;* and because their muscles are still feeble and little exercised, most of them say *tŭm* for *come*, *to* for *go,* and *voo* for *you*, because the guttural consonants *k* and *g* are more difficult than the palatal *t.* Double consonants are formidable, and they usually drop one of them, as *seep* for *sleep*, *bin* for *bring*, because the muscular effort of uniting them is too great. And we allow all this because we know that exercise and habit will one day enable them to articulate all the sounds perfectly. And how much more ought we to be like kind Nature in our treatment of those who cannot hear, whose organs of speech have become rigid from long disuse, and whose mental control over them is not instinctive but acquired! We speak our own language fluently, but it was not always so; and when we apply ourselves to learn a foreign tongue, we find the new sounds very difficult to master. The difficulties of the deaf must therefore be proportionately greater, for not only are all the sounds new, but the vocal organs have not been trained to utter any. Our rule, therefore, in teaching speech to the deaf is, *to begin with the simplest and easiest sounds, and thus to advance in the order of their increasing difficulty till all are learned.*

In conforming to this fundamental rule, certain conditions must be taken into account.

The simplest and easiest sounds must be sought, not from our own, but the deaf-mute's point of view, as he has to depend on two senses only. Hearing being excluded, sight, touch, and muscular facility must determine what is easiest for him. Whatever therefore he can *see best*, *feel best*, and *execute with greatest facility*, should have the preference. The last of these conditions is the most important, but sometimes from the inability to see or feel the organs in action, the learner has little to assist him to form any idea of what he should imitate. A sound more difficult in its muscular action may, therefore, prove easier to imitate because its position and action can be more clearly perceived. This is the manner of Nature. Let the vowel *a* serve as an illustration. The muscular action is simply opening the mouth to its proper width, avoiding effort. The tongue rests in its bed, the voice issues freely from the glottis, and escapes between the open lips. These positions are visible, while the learner's hand feels the vibration of the vowel on the external side of the larynx. Its imitation is, therefore, easy, and it satisfies the required conditions of greatest facility.

Serviceable Natural Muscular Actions. These have been formed by habits unconnected with speech and arising from the reception, tasting, enjoyment, mastication, and assimilation of food, from exhaling and inhaling the air and from blowing the nose, which ought to be utilized as far as possible in teaching speech, because the muscular actions in both have something in common and are already familiar to the learner.

In *breathing* the air escapes through the mouth or the nose, or both. Little children and the deaf generally breathe through the nose; but some use the mouth, especially in sleep. Greater command of the lip and jaw muscles leads to a larger use of the nose, and concentrated effort, whether mental or physical, to close-pressed lips and contracted cheeks. But whether the breathing is through the mouth or nose there is a special though unconscious rising or falling of the *velum palati*, similar to that required for all the oral and nasal phonetic elements. Voice only has, therefore, to be added to these natural functions in breathing for the one class or the other. Some of the deaf seldom breathe through the nose, apparently from some obstruction ; but it is usually a result of dumbness and the absence of the mental control of the organs which growing intelligence would have supplied. In such cases breathing only through the nose ought to be made a frequent exercise. This would lead to the free fall of the *velum* and prepare for the nasal sounds. Again, if breathing through both mouth and nose at the same time has become a habit, it should be broken, and each made thoroughly independent of the other by suitable exercises. If this is neglected the vowels will have a nasal twang.

Blowing the nose is a special effort. Many children do not like it, but all ought to be able to do it freely, for it forces the air through the nose, pressing down at the same time the *velum*, and increasing the force of the lungs to provide the blast. The sound, too, may be heard as well as felt by the deaf and suggest its vibrations to hearing as well as touch.

Tasting employs the tongue in rolling the food about the mouth and in pressing it against the hard palate, and if the substance is sharply astringent the pressure is greater. Attention can be easily directed to this habit when we are introducing the learner to the consonant *t*.

But the lips are also much used in *sucking* from the dawn of life. We may reprove the "smacking," but we overlook the service it renders in calling the labial muscles into more efficient use.

Then the action of the tongue and larynx in *swallowing*, which is as great towards its base as speech will ever require, is a natural preparation for the guttural sounds, which are our chief difficulty. Let the learner be made acquainted with this action by placing his finger on the upper larynx, and he will perceive how a similar action is required for guttural sounds.

It would be worth while to try to teach the deaf *to whistle*, as it secures the command of the lips and the air.

In addition to these there are serviceable forms of *facial expression*, which most deaf children have in common with the hearing, which might well be utilized in preparing for speech. Nearly all the muscles employed in speech are active in them, and by increasing this activity artificially, and directing attention to it, its effects can be at once referred to when speech requires their aid.

Laughing is one of these. The muscles chiefly engaged in this expression are the *risorius*, which is attached to the angles of the mouth and spreads out over the masseters, and the *buccinator*, which also takes part in this action. These muscles are also active in *y* as heard in *youth*, and in some of the rear palatal vowels.

Anger is usually expressed by closing, compressing and protruding the lips, and raising the chin. The muscles employed are the *orbicularis oris*, *elevator of the upper lip, and elevator of the chin and lower lip* (Fig. 17) for the lips, and the *buccinator* for the cheeks (Fig. 17). The more intense the passion, the more muscles are engaged, as in the action of the *depressor alæ nasi*, to which the articulation of the sounds *p*, *w* (*m* ?), and *ō* has points of similarity.

Wonder is expressed by elongating the face, by dropping the chin, opening and protruding the lips, as in *o*, and contracting the cheeks. This draws down the upper lip and depresses the lower. The sound *a̤* requires a similar muscular action about the mouth.

Fear and *wonder* are closely related in expression, only, in the former, the angles of the mouth are withdrawn, the teeth exposed, and it has less effect on the length of the lips. Guttural sounds produce a similar action of the mouth.

Joy is akin to laughing, and causes the raising and drawing backwards of the angles of the lips, the *great zygomatic* muscle and *elevator of the corner of the mouth* (Fig. 17), still more.

Scorn is expressed by projecting the lips, swelling the cheeks, and elevating the chin. These motions bring into action many of the muscles which are used in labial vowels and consonants. Altogether a most useful expression. Sometimes in mocking and contempt, one cheek, generally the right, is contracted, and the angle of the lips much withdrawn. The look is angular over the right shoulder at the same time. If the expression is repeated on the other side of the face, the muscular action will be still greater, and aid in illustrating the sound *k*.

Generally, it may be said that the gentler emotions relax, while the fiercer contract the muscles.

Nothing more is intended in referring to these facial movements than to suggest the manner in which the muscular action can be made use of in articulation.

Articulation of the Phonetic Elements of Speech. The importance of teaching the speech-sounds in that order which would most facilitate their acquisition is considerable, for a bad arrangement would delay and vex the learner by making demands on his organs and his patience which he is not prepared to satisfy; but on the other hand, a good arrangement, in which the sounds follow in the order of their increasing difficulty, would facilitate his progress.

The subject has engaged the attention of most of the leading masters, but a glance at their phonetic alphabets is enough to prove that no two of them agree. They all differ on some principal points Some begin with the vowels, some with the consonants, while others mix them. Evidently the authors have not been guided by the same or any well-founded principles, else such variations of arrangement could not exist. However, a closer examination of two of them, Rössler's and Vatter's, reveals the influence of the guiding principle of organic facility for the learner. While Rössler begins with the vowels and consonants of the labial class, Vatter associates the principal vowels with all the consonants in succession. The former is evidently influenced more by organic facility, while the latter takes the syllable as his starting point, but he is not indifferent to the order of the consonants. This seems to be the direction in which a satisfactory leading principle of order is to be found. The learner's command of his own organs always determines his rate of progress. But this command is slowly acquired; for he is like an infant beginning to speak, and must have all the help that can be received through sight and touch. To begin with those sounds which require considerable organic action and nice adjustment, and which he cannot so well imitate in another, would be a mistake. On the contrary, to begin with those which are the simplest and most perceptible to his senses must be best adapted to his condition. We ought then to be guided by these three conditions: 1. *Facility of muscular action.* 2. *Visibility.* 3. *Tangibility.* Or, the organic and muscular effort he is required to make in uttering sounds should be for him that of greatest ease. He ought also to be able to see the action in his teacher, feel its effects in the vibrations of the voice, and thus make it intuitional in his vocal imitation.

The sounds in which these conditions most fully unite ought to be first taught, for, while they are the least difficult, they prepare the organs for the more difficult.

The following classification of the sounds has been adopted on this principle and those previously stated:

First Class.—ä, p, f, ō, th (*thin*), ū, m, h, a̤, ă, ŏ, ŭ, v, th (*this*), b.

The three conditions unite in all these.

Second Class.—t, ā, ē, ĕ, n, ī, oi, ou, w, ĭ, l, s, sh, z, d.

These are more difficult, for the conditions are different. The muscular action being more complex, the eye is not so helpful as in the first class.

Third Class.—k; *guttural* ā, ă, ĕ, ĭ, ŏ, ŭ; g, y, ng, g (*soft*).

These are nearly all guttural, and therefore still more difficult to the learner, whose sight and touch are no longer so helpful in their articulation.

Fourth Class.—j, ch, x, q, r.

*FIRST CLASS OF SOUNDS.**

ä, p, f, ō, th (*thin*), **ū, m, h, a̤, ă, ŏ, ŭ, v, th** (*this*), **b.**

ä (*far*).—We have already explained (pp. 224 and 227) the production of this sound.

p.—This is an air stop which implies that the air is pressed forward from the lungs—of which the learner ought to be made aware—and arrested by the lips, which are closely pressed together and somewhat protruded. The tongue is close down in its couch, its tip touching the lower incisors, the cheeks close to the molars, and the *velum palati* well up, so that the air is pent up in the tube thus formed and ready to explode when the lips are opened. All these points should be carefully explained to the learner. One of his hands on the teacher's chest and the other before his own lips will enable him to perceive the action of the lungs and the explosion of the air. When the muscular action of the sound has become easy, then it ought to be united with *ä*; and this introduces the conversion of air into voice, which lessens its force and produces the vibrations which can be felt on the larynx, cheeks, and lips. There is some danger that an attempt will be made to deliver *p* first and pronounce *ä* independently, but this can be prevented by making it evident by touch that they are united in one impulse. The absence of the strong explosion further assists in distinguishing a vowel from an air consonant. The muscular action in *pa* is considerable, but all is simple, visible, and tangible; and it ought to be thoroughly learned, for it is the first stone in the phonetic edifice.

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* The writer, not being in a position to practically test the descriptions of the articulation of the elements of speech, is unable to guarantee them to be absolutely correct, but believes they are sufficiently so to answer the purpose.

He cannot say quite the same of the "readings." They are founded on the author's own observation and interpretation of the muscular action concerned, and it is probable that in this he is not invariably correct. If the teacher will take this explanation in connection with what has been said under the head of "Lip-Reading," he will be able to use his discretion and make due allowance for possible errors.

The order of the sounds in the four classes given above does not, in the original edition, correspond with that in the text. The latter has been adhered to and the order conformed to it accordingly.

Reading.—The muscles chiefly employed in articulating *p* are the *orbicularis oris*, *elevator of the chin and lower lip, great and lesser zygomatic* (Fig. 17), and *a* in Fig. 6. The action in both *p* and *ä* is marked, but when united it is large, and distinguishable from all others. First the tension, then the relaxation of the lips, their opening and the fall of the jaw can be seen by the learner and closely imitated as a primary element in lip-reading.

f.—This consonant is not an air stop, but air fricatively modified. It is labial and dental, for it is formed by the gentle pressure of the upper incisor teeth on the lower lip, which is drawn somewhat inward to meet them.

The spaces left by the form and position of the teeth provide the escapes for the air forced through by the lungs, which creates its broken sound. Were the lip pressed against the teeth instead of on them the air could not escape, so that there would be no sound. It must be, therefore, closely seen to that it is placed right under them. The teeth and lip can both be seen, and the learner ought to have no difficulty in imitating their position in *f*. Next, let it be united with *ä* in *fa*, and the change of the air into a vocal form can be felt by both hands. The usual defect is in the excessive force with which the air is expelled.

Reading.—The muscles employed in articulating *f* are for the lower lip, the *elevator of the chin and lower lip* and *great zygomatic* to draw back the angles, and the *buccinator* to press the cheeks against the lower molars (Fig. 17). The first named muscle is used to raise the lip to the teeth. The learner can be aided by the finger laid in the hollow of the chin, and pressed gently against the lip, which may be thus moved to its right position. Two syllables are now available for exercises, *pa-fa*, *fa-pa*; and it will be seen that the muscular action in passing from *pa* to *fa* and from *fa* to *pa* is very considerable. These syllables are, therefore, the best indicators of the sounds.

ō (*note*).—The whole vocal tube, of which the lips are the visible opening, conforms to their roundness, for the tongue presses close at its root, the cheeks are drawn close, the jaw is dropped, and the lips rounded to let the sound escape through a round aperture. The larynx also takes a part, for it is drawn upwards, and the vocal cords are closer, because *ō* is in a higher pitch than *ä*.

Learners usually fail in the form and size of the lip orifice. It is either too large or too small. Much depends on the dropping of the jaw. If this is great the lips will round better, but if only partial the muscular power in the lips will not be equal to the demand. A finger or a piece of wood of the same shape will suggest the size and form. The cheeks, also, should be pressed close to the under molars, and to secure this action fully a finger and thumb might be pressed against them above the molars. This also aids in protruding the lips for rounding.

Reading.—The muscles most employed are the *orbicularis oris* (Fig. 17), for rounding the lips; the *digastric*, for the opening of the jaws; the *buccinator* (Fig. 17), for the cheeks, and the *pterygoideus externus* for advancing the angles of the mouth to enlarge the space. The form and position of the lips, jaw, and cheeks are the best indicators of this vowel. In contrasting it with *ä* the difference in muscular action is considerable. Their union, also, with the consonants already learned, *fa*, *po*, *fo*, *pa*, developes the muscular action which passing from one syllable to another requires. Let the finger of the learner on his larynx feel its movements in pronouncing these syllables, and he will more closely imitate their action. Another phase of muscular action will be apparent which elsewhere we have called anticipative. The position of the lips in the *p* of *po* differs from that of *pa*, for in orde to lend themselves the more readily to the articulation of *ō* they are raised to its level, and projected before *p* passes into it. This is evidently for facility. The learner may be led to imitate it if he is directed to raise his lips as if he were about to pronounce *o*, and while in this position let him close them, pronounce *po*, and he will perceive the difference in facility.

th *(thin).*—Two letters serve for one sound only. In formation it is analogous to *f*, but, instead of the lip, the tongue presses against the upper incisors, and the air flows through the open spaces between.

That the tongue may act freely, and press against the teeth at a convenient point, and yet leave a free passage for the air to escape through the gaps still left, the jaw rises and retreats somewhat. The under lip also presses up against the tongue and assists in preventing any escape of the air below it. In fact the organs are so arranged as to confine the air to the part of the vocal tube between the tongue and palate. If the learner were to place a hand before the teeth he would feel the place and force of the current in his teacher's articulation of the sound. By holding the tongue in the *th* place while the lips are parted more widely, he will also see how it presses against the upper incisors and the molars. Let the teacher place his finger on the hollow of the chin and gently raise up the lip till it is in the right position. At first, very likely, the air will be permitted to escape at other points, or the tongue be too much protruded or withdrawn, but all this can be obviated by directing attention to *f*, in which the air is confined to similar gaps in its escape. Then pass on to *th*.

Reading.—The principal muscles employed are those of the tongue, the *pterygoid*, the *masseter* (Fig. 17), and the *angles of the lower jaw bone* (Fig. 18), in advancing the jaw. The lower lip is raised by the *orbicularis oris* and *elevator of the chin and lower lip*, and the cheeks pressed by the *great zymogatic* and *buccinator* (Fig. 17).

The position of the lips with the rise of the lower to the tongue, the advance of the chin and angles of the lips, with the contraction of the cheeks, are the principal distinctive signs. But these traits when *th* is united with *ä* and *ō* are emphasised. Out of the five vocal elements now learned a number of exercises may be made, including the diphthongs *oa*, *ao*, as *thoa*, *thao*, *foa*, *fao*, etc.

ū as in *tube*, or shorter as ṳ in *bull*, longer as in *rule* and *brute*, corresponding to the ö of Ogilvie. The muscular action required by this vowel is principally labial. To pronounce it the lips must be considerably protruded, but at the same time not contracted in their width. The tongue is slightly elevated towards the base. This reduces the tube to the best form, while it delivers the current of voice at the lips. The whole tube is, therefore, conformed to the vowel sound. The learner's failures are in not protruding his lips sufficiently or contracting them as in *ō*, but these can be corrected by putting a finger at the angles of the mouth and gently drawing them backwards, which lengthens and narrows the orifice. The eye and touch will aid in producing the correct sound It can also be illustrated by two slips of paper held in contact between the finger and thumb of both hands and made to part in the middle till a similar aperture is formed. The defects can be shown by reducing its length and increasing its breadth.

The exact phonetic value of this sound is difficult to determine, for it varies from *oo* in *boot* to *u* in *rule*. Possibly the reason might be found in the final consonant, or the greater facility in pronunciation on account of the whole muscular effort required by the syllable. Nothing is gained by reducing it to two or more vowels. All that is necessary is to secure its longer or shorter use, and this can be done in teaching the words in which they occur.

Reading.—The muscular action in *ū* is chiefly in the lips (the *orbicularis oris*, Fig. 17), which must not only protrude considerably, but rise towards the nose in conformity with the form of the passage. This requires the aid of the *depressor of the corner of the mouth*, the *buccinator* and *great zygomatic* (Fig. 17) also to get the lips into the flat tubular form required by the sound.

The position and form of the lips, and the rise of the chin are the best signs of this vowel. It ought to be contrasted with *ä* and *ō* in pronouncing them in different orders, till the eye of the learner can quickly distinguish them. Conjoined with the consonants already learned, as *pu*, *fu*, *thu*, the complex muscular action which they require gives character to *ū*; and then if *pa, po*, *pu*, *fa*, *fo*, *fu* and *tha*, *tho, thu* are repeated the variations of muscular action will much assist in their intelligent discrimination. Lip-reading thus leads to the knowledge of the organic positions, which is of great use in the repetition of the sounds; for the scholar perceives that the organs must be correctly placed to ensure correct lip expression.

m.—Of the nasal sounds *m* fills the chief place in the aid it renders to the learner in arriving at a better conception of the resonance of the organs in the formation of a number of sounds. His finger ought, therefore, to be made familiar with its nature, by being placed on the side of the nose. The muscles are chiefly employed in firmly closing the lips and letting fall the *velum palati* so that the voice may escape wholly through the nose. The pitch of the voice in *m* corresponds with that of the vowel which precedes or follows it, only a little sharper from the difference in the vocal tube and the increased muscular pressure. This consonant is a fine instance of the manner in which the other organs follow suit in the direction of the point of greatest muscular effort. As *m* has to be delivered through the nose, the lips, jaw, and tongue all move in that direction to secure its right production. As much of this as possible ought to be indicated to the learner. But fortunately Nature herself comes to his aid, for the mere passage of the sound through the nose with full resonance is usually followed by this general upward movement.

Reading.—The muscles employed are the *elevator of the upper lip*, *orbicularis oris*, *great* and *lesser zygomatic*, and the *depressor alæ nasi* (Fig. 17). The action enables us to distinguish this consonant from *p* and *b*, for it lifts the jaw, shortens the upper lip, and contracts and vibrates the walls of the nostrils. The upper lip and the nostrils are the best indices of *m*, for neither *p* nor *b* requires similar muscular efforts. The learner ought, therefore, to mark them well.

The deflection of the voice through the nose is usually attended with grave difficulties to the learner, for he seeks to nasalize the vowel with which the consonant is associated, especially if it follows. Better then to begin with a vowel as in *am*, *om*, *um*, and guard against any escape of the voice through the nose, by having it fully pronounced before *m* is added. The head ought to be well up in this exercise to let the vowel pass freely, and admit the play of the muscles in both sounds. When the exercises have sufficiently led to a clear perception of the difference in form between the two sounds, then the inverted order *ma*, *mo*, *mu*, can be used. At the same time, care ought to be taken that, while one error is being avoided, another is not induced by separating the *m* and *a*, so that they do not form a syllable. This lesson is complex and delicate, but it is of great importance in giving larger muscular power and control in conditions that are eminently favourable to sight and touch, which are both available. *m* is a nasal semi-vowel, and yet fulfils the functions of a consonant, for it is never used except in union with a vowel.

h.—This sound is called a breathing or pure aspirate, for it is nothing more than a mere flow of air from the increased force of the lungs, and slightly modified by the larynx in passing. The organs adapt themselves to the form required by the associated vowel in its articulation. When joined with a vowel as *ä*, the change of the current from a pure aspirate into voice is found to arise principally from the contraction of the vocal cords, and the additional lung force. Considered in this way, it would appear to bear the same fundamental relation to all aspirates which *ä* does to all vowels. If the learner produces it more forcibly at first, as a puff from the glottis, and afterwards more gently, its true phonetic place will be found.

Reading.—When united with a vowel the muscular effort in passing from air to voice is discernible. In other respects the muscular action is greater in *ō* and *ū* than in *ä*, where it is exceedingly small. It is, therefore, very difficult to read. But the difficulty is considerably diminished by its association with other more expressive sounds.

The tendency in our speech is to drop it altogether.

a̤ (*fall*) —In pronouncing this vowel, the vocal tube has attained its greatest capacity, and therefore its pitch is the lowest [except perhaps *ū*]. If the finger is on the larynx, it it found to have descended even below the *ä* position. The tongue is drawn backwards and downwards, and a large space is left in the cavity for the sound to resonate before it escapes from the lips, which are rounded, but lower down than in *ō*. In these conditions, the vocal cords are much relaxed, so that the sound is graver than *ä*. As *a* is the extreme voice compass on the bass side, and *ē* on the treble, these vowels bring the muscles into their largest exercise. Their thorough acquisition must, therefore, materially assist in the pronunciation of all the intervening vowels, and when they are united with *p*, *f*, *th*, and *m*, the muscles find ample exercise. But the jaw must retreat as well as fall to get into position. The finger of the teacher on the upper and lower incisors will lead the learner to perceive, as he pronounces *pa̤*, that they not only part considerably, but the lower retreats half an inch before the *a̤* place is attained. The three essential things to its full pronunciation are, therefore, the form of the lips, the position of the jaw, and the depression of the larynx.

Reading.—The most active muscles are the *depressor of the lower lip* to depress the under lip, the *orbicularis oris* (Fig. 17) to depress and elongate the upper, and the *temporal* to place the jaw. All these movements, when conjoined with consonants, are so marked and so expressive, that the lip-reading of this vowel is easily learned. It ought to be classed with *ō* rather than *ä*.

ă (*map*), **ŏ** (*mop*), **ŭ** (*pup*).—The vowels and consonants now learned are all formed by visible and tangible organic action, and are therefore the easiest for the scholar. But they are not all the sounds of this class. There are the short vowels corresponding more or less with the long sounds of the vowels *a*, *o*, *u*. These are *ă*, *ŏ*, *ŭ*. They have been reserved because they are best learned after the long sounds. Some masters teach them apart, but the arrest of the voice is not only difficult, but likely to introduce an alien element. They are therefore best learned in syllables with a final consonant, as *ă* in *map*, *ŏ* in *mop*, and *ŭ* in *pup*, for it is found that so related there is greater facility in shortening the sound. The eye and touch of the learner will aid him materially in perceiving the shortness of the vowel.

ă as in *map*.—The sound is the same as *ä*, only modified somewhat by its rapid delivery and connection with another consonant. In order to secure its correct pronunciation let the corresponding long vowel be first pronounced, and then the final consonant added. Touch and sight will show how it is shortened in articulation.

Reading.—The lip-reading of *fap* is easy because, in addition to the muscular action in *fa*, another action is added to get the organs into position for the final *p*. The finger on the larynx will also show how much it participates in these movements. As there are many syllables in the language of the same form, lip-reading is largely provided with convenient elements.

ŏ as in *mop*.—This is *ä* pronounced short, but more like *ă* modified by the final consonant. The rapidity of action in anticipating the new position of the final consonant interferes considerably with the fall of the jaw in *t* and *k*, but in *f*, *p*, and *m* the action is more facile. Radically it is the short sound of *ä*, and mistakes can be best corrected by reverting to the long sound.

Reading.—The muscular action in *mop* is the same as in *law*, but the final consonant requires a large command of the digastric and other muscles to get the jaws and lips into the new position; but this only increases the facilities for lip-reading, if all the motions are noted.

ŭ as in *pup.*—This might be well called another vowel, because it has little in common with *ū*. The lips are not much protruded, but only drawn apart. It would, therefore, be better to teach it independently. It has a guttural form, arising from its connection with guttural consonants. Here it is not guttural, for the vocal tube is open, though reduced in diameter.

Reading.—The position and form of the lips, by the action of the *orbicularis oris* (Fig. 17), are sufficiently distinguishable from those of *ă* and *ŏ*, and the consonants with which it is united still more assist in its perception. But it would be well to have some exercises in which these short vowels might be contrasted, as *fam*, *fom*, *fum*, *map*, *mop*, *mup*, *pap*, *pop*, *pup*, etc.

Fricative Sounds. Two principal factors unite in every element of speech, position and sound, but as the second may be either air or voice, the specific difference, in some consonants, lies in the use of the one or the other, rather than in any marked difference in the position of the organs. As already seen, *f* and *th* (*thin*) are aspirates or air consonants, but both, when voice takes the place of air, change their nature, and become *v* and *th* (*this*). These are called fricative, because the voice is rubbing in its escape. But they are really vibratory in respect to the lip in *v* and the tongue in *th*, for in each there is a perceptible, rapid, and rhythmic movement. The manner, also, in which the lip and tongue are braced proves that they are put into the posture which best fits them to vibrate under the action of the passing voice.

V.—The position of the incisor teeth in *v* is not exactly the same as in *f*. They rest lightly against the interior edge of the lip rather than on its top. This permits the free vibration of the lip against the teeth, which can be felt by the finger of the scholar, and while he pronounces it, in his teeth also. In its production a stronger expulsion of the voice, by the diaphragm, will at first be necessary in order to produce the vocal vibration or humming sound. A partial or imperfect articulation ought not to be allowed; and to prevent failure and aid the learner, a finger and thumb ought to be pressed firmly on the lip near the angles, drawing it back a little each way towards the molars to suggest the required muscular action and enable him to perceive the true nature of the sound; for, if he discovers it clearly here, he will be able to reproduce it in kindred sounds.

Reading.—The muscles employed are the same as those in articulating *f*. As distinguished from *f* the difference lies chiefly in the muscular tension of the lip, which for *f* is free, and in the *great zygomatic* (Fig. 17), drawing the cheeks still closer to the teeth at the same point. In other respects they are left free to participate in the vibration, and give space to the volume of voice advancing to the lip. Now, if *fa*, *va*, *pa*, *vo*, *fo*, *va*, *tho*, *vu*, etc., are alternately pronounced, and attention directed to the difference of muscular action between *f* and *v* in each pair, their difference in reading will soon be learned.

th (*this*).—The position of the tongue against the upper teeth is not exactly the same as in the aspirate, but more advanced to permit its free vibration, as with the lip in *v*. The under lip is brought close to the tongue, and the cheeks to the molars, thus enclosing the space between them so that the voice may be concentrated on the point of escape. Yet the pressure is light, to permit the full resonance of the sound in the cavity and on the tongue.

Reading.—The muscles chiefly employed are the same as in *th* (*thin*). But the base of the tongue is well sustained to increase the facility for resonance in the tip. Happily, the learner falls freely into these positions by endeavouring to secure the vibration at the teeth. The differences between the two sounds of *th* are slender, and arise from the action of air in the one, and voice in the other. The former requires some pressure, and therefore the lip muscles are contracted, but in the latter they must be relaxed for the resonance of the sound, and are less active. So the sound can be distinguished.

b.—A new form of sound now demands special attention. This is the voice stop, analogous to the air stop in position, but generally different in substituting voice for air. In this its greater difficulty lies. The arrest of the voice, just as it is initiated, without permitting it to escape, is difficult to indicate to the learner, and still more for him to imitate. By touch he can feel the action of the voice in the larynx, and its vibrations in the cheeks and lips, but its mode of production is concealed. Better, then, to refer to *p*, and point out that what is done for the air in this sound, must now be done for the voice, and instead of making *b* initial in a syllable, make it final, so that it will actually arrest the flow of the voice as in *ab*, taking care that additional lung pressure is brought to bear on it, so that the resonance is continued as long as possible. Then let the hand of the learner feel that it is not explosive like *p*. The special pressure of the diaphragm can be felt and imitated, and this will secure its proper initial use. The mistake usually made by the learner is to let his voice escape through the nose, as in *m*; but this must be guarded against from the first by using touch to perceive the absence of sound in that direction. The acquisition of this consonant is of great importance, because it is the easiest of all the voice stops.

Reading.—The muscles acting in *b* are the same as in *p*, only with less pressure of the lips to permit the free vibration of the voice, hence the *orbicularis oris* (Fig. 17) does little more than hold them till the sound escapes. This ought to be pointed out, and the difference between *p* and *b* is best impressed by exercises in which they alternate.

p, m, b. — These three consonants so closely approximate in facial expression that some assert the impossibility of distinguishing them. But a more careful study of their differences would have convinced them of the contrary. In *p* the lips are pressed together, producing thereby evident lines; but in *b* there is no marked pressure, as they are simply closed, and normal in their contour. These two sounds can therefore be distinguished. Again in *m* the jaw and upper lip press upwards towards the nose, the seat of the sound, and this action is sufficient to distinguish it from *p* and *b*. If suitable exercises are framed in which these sounds recur in any order, as *pat*, *bat*, *mat*, *map*, and then inverted, as *pam*, etc., the learner will soon show that he can distinguish them.

SECOND CLASS OF SOUNDS.

t, ā, ē, ĕ, n, ī, oi, ou, w, ĭ, l, s, sh, z, d.

The observant teacher will have seen that in all the sounds of the first class, with the exception of *th*, the tongue plays only a minor part, while the lips and teeth are the chief actors. The vigour and facility of their muscles will have, therefore, been largely increased, and we can now advance into the next class, in which the tongue is the leading actor, but in which neither sight nor touch will be so helpful as in the first class.

t.—This sound takes the lead, because, both by place and action, it prepares for the easier articulation of several other consonants, which are all palatal and allied.

Before attempting to articulate *t*, the tongue ought to be put through a number of gymnastic exercises by pressing its tip on different points and substances, as against the lower and upper incisors, cheeks, and palate, beginning close by the upper incisors, and upwards as far it can be turned. Then against the fingers of the teacher, so that an idea of the pressure required by *t* may be given.

But there is a danger that instead of the tip only, the whole tongue will be raised to the palate, and so deprive the sound of the sharpness and neatness it has in our language; or that instead of the tip, the root may be pressed against the palate, and the soft *t* of the Erse follow; or pressed against the teeth instead of the gum, and the Welsh *t* follow. These errors ought to be strictly averted, or corrected if already committed. The learner should be shown that *p* and *t* exactly correspond in the retention and explosion of the air, by the closer pressure of the organs specially engaged, and the additional lung force exerted at the moment, but that in *t* the tip of the tongue and the gum take the place of the lips in *p*.

Reading.—As the retreat of the jaw provides a greater space for the action of the tongue and positions of the teeth and tongue behind, the lips are the principal features, but the union of *t* with a vowel, such as *a*, *o*, or *u*, gives it more character. But *tē* as in *tea* requires a quick short movement of the jaw in following the movement of the tongue from the *t* to the *ē* position. In *tī* which is *tä ē*, the intervention of the *ä* increases the action, but not without modifying the *ä* for muscular ease.

ā (*fate*).—This has been reserved because its pronunciation is affected by *t*. As already shown, in pronouncing *pä* the jaw does not retreat but simply drops, but *t* cannot be articulated with ease unless the jaw retreats to accommodate the tongue. Then if the mouth is opened and the tongue falls slightly, so as to form the proper position for *ā*, *tā* is pronounced and the sound of *ā* is produced without effort. And should any of the labial consonants precede, as *bā*, *fā*, *vā*, etc., the jaw retreats to the same point to accommodate *ā*. If the *ā* position is carefully examined, it will be noticed that the back of the tongue rises nearer to the palate, the jaws approach till the teeth are in the same line, and the larynx rises somewhat, for *ā* is on a higher pitch than *ä*. The form of the vocal tube, as well as its length and diameter, are in accord with the sound. Upon the whole, the *t* position of the tongue and jaw, except when the tip of the former touches the gum, are best adapted to the pronunciation of *ā*.

Reading.—Compared with *ä* the differences lie in the narrower space between the lips, and the retreat of the jaw, which draws the lower lip along with it. The angles of the lips are also seen to act. Following *p*, *m*, *l*, and *t*, it is also seen to be the mediant of *ä* and *ē*. The rise of the larynx confirms this, and shows that the vocal tube is shorter and flatter.

Let the modifying effect of the position and pressure of the tongue against the alveolar process be carefully noted, and it will be seen that to facilitate this action the jaw retreats considerably, as seen in the relation of the lips to each other ; and that as a consequence, to facilitate pronunciation and avert undue muscular effort, this position of the jaw is retained in the pronunciation of the associated vowels, by which they are considerably modified, according to the principle already illustrated.

ē (*me*).—This sound is so closely related to *t* that it might be called the *t* vowel, for the tip of the tongue has only to drop a little from the *t* place—less than in *ā*—and the back to rise a little towards the palate, for its production. The jaws and the cheeks are in the same relations, .only it will be perceived that in passing from *t* to *ē* the tongue is withdrawn still more, while it rises towards the palate and the larynx follows. On the other hand, in uniting *ē* with labial consonants, the tongue is more advanced, proving that the vowels are modified by the consonants. Should this fail, then let the tip of the tongue be pressed against the lower incisors and the jaw raised, while the back of the tongue gradually approaches the hard paláte till the space left suffices for *ē* ; or, failing this, let a small penholder or ivory knitting needle be passed underneath the tongue over the first of the molars, at the same time holding down the tip behind the under incisors, and then let the jaw be raised till the space for *ē* suffices. These are only expedients, for the tip of the tongue does not press against the lower incisors in pronouncing the pure *ē*, but retreats from them a little. Nor is the relation of the tongue to the teeth of the lower jaw uniform, as the palate varies considerably in depth.

Reading.—The acting muscles are the *great zygo-*

matic, *masseter* and *buccinator* (Fig. 17), for drawing back the angles of the lips, raising the jaw and pressing the cheeks. These are the principal indicators of this vowel. But the larynx has also an upward movement, for the pitch of *ē* is the highest vowel sound and the vocal tube is at its smallest dimensions. Labial consonants best assist in giving it expression, as *pe*, *be*, *fe*, *ve*, *me*, and then with final consonants, as *peep*, *meat*, *beat*, *feet*.

ĕ (*met*).—This is the short sound of *ā*, but, like others, modified by the consonants which precede and follow, as *pen*, *fen*, *bet*, *set*, *fell*, which are all pronounced with the jaw and tongue in the same positions. Owing to the position of the tongue *ĕ* is somewhat guttural in tone, and lacks the clearness of the other vowels. Its union with consonants, both initial and final, helps much in its reading, for the angles of the lips are drawn back in some of the labials, nasals and advanced palatals.

n.—This is formed by placing the tongue in the *t* place and passing the voice through the nostrils, the *velum pendulum palati* falling for the purpose; *m* is analogous, and to avoid errors it is better to repeat it, reminding the learner how it is formed, and then asking him to do the same thing for *n*.

The pressure of the tongue against the palate is, however, more extended towards the soft part, but this follows from the muscular action required for passing the nasal sound.

Reading.—The upward movement of the lip muscles and the vibrations which accompany the strong resonance of the sound distinguish it from *t*. Scholars do not find much difficulty in detecting these differences. The muscle, *elevator of the upper lip and wing of the nose* (Fig. 17), is active. Such syllables as *pet*, *pen*, *bot*, *bon*, *fat*, *fan*, *nap*, *net*, *nut*, *tep*, etc., bring out the differences more fully.

ī (*pine*).—This is a diphthong made up of *ä* and *ē* quickly combined. Some shorten or modify the *ä* and give *ē* the fuller sound. Some, again, begin with *ä*, others with the guttural *a* in *can*. In the West of England the latter is heard very fully pronounced.

Reading.—The organic positions of *ä* and *ē* have been already noticed. Their union is the principal muscular action, and this is considerable, for as the voice glides from the fundamental sound to the highest, the jaw and lips are brought into continuous movement and *ī* is therefore read with facility.

oi, ou.—The diphthongs *oi* as in *boy*, *ou* in *out*, can be now pronounced as all their elements have been learned; *oi* or *oy* is formed of the elements *a̤* and *ē*, *ou* of *ä* and *ū*.

After learning them apart, words in which they are found, and whose other elements have been learned, ought to be collected, as *boy*, *toy*, *pout*, *mouth*, *found*, *mound*.

The marked muscular action seen in their pronunciation renders them easy to distinguish and read. As voice exercises they are invaluable, for, rising from the lowest tones and gliding on to the highest, they touch several partial tones, and form good exercises for the control of the glottis and the improvement of the voice.

w.—This has a special sound when used as a consonant, but otherwise it is either a vowel or silent. The muscular action in *w* is similar to that of *oo* or *ū*, only the lips are more protruded and brought closer together. The voice, when forced through the passage, vibrates the lips, and seems to receive some additional resonance from the walls of the greater space anterior to the teeth. And, more than this, the rapid retrocession of the lips against the current of sound very probably assists in giving *w* its peculiar semi-vowel character. The vowels with which it is usually joined, from their organic positions, require rapid glides and considerable muscular exertion in articulation, so that it is difficult to determine its exact form. *W* joined with *a* glides quickly into it, but with *o*, requires a separate vocal impulse from the similarity of their forms. In the latter *w* is heard more independently, and approximates to *oo*, but requires a still greater muscular effort in the lips. There is little doubt the whole vocal tube participates in giving *w* its resonant form.

The muscles usually employed are the outer fibres of the lip muscle, the *orbicularis oris* (by which the lips are protruded), the cheek muscles, the *great zygomatic* and *buccinator* (Fig. 17), and the *pterygoideus externus,* with the advance of the jaw, bringing it into position. The protrusion of the lips largely assists in all this action by lengthening the tube, so that the pitch of *w* is lower than *ä*.

Reading.—The muscular action in *w* is so much greater than that of *oo*, and so varied by its union with vowels, as to make the signs so full and distinctive that it can be soon read. It ought, therefore. to be articulated with them, as *wa, we, wi, wo.* Placed after a vowel it is either *ū* or silent, as in *slew* = *slū*, *sow* = *so*, *mew* = *mū*. But united with a consonant, as in *twin*, it retains its initial value.

Ĭ (*pin*).—The *t* place of the tongue is very favourable to the pronunciation of *ĭ*, as in *tip*, *nip*, and it would be well to select final consonants like *p*, *n*, *m*, in *tip*, *pin*, *fim*, to sustain the tongue in its position, for there is a muscular attraction of the tongue in the same direction. The normal position of the tongue is very near the gum, and between the two a very narrow space is left for the sound to escape. In this narrowness of the passage it resembles *ē*, but its more advanced position lengthens the vocal tube and lowers the pitch.

But *i* in *tip* is not the only short sound of the vowel. It has also to yield to the modifying power of the consonants, for when it follows *k*, *g*, and *r*, as in *kit*, *gim*, *ring*, it is formed on the soft palate, and is rather a short *e* than *i*. Such changes of the vowels are more or less prevalent throughout, and are results of the same cause—the modifying power of the consonants with which they are united.

Reading.—The distinct features of *ĭ* as compared with *e* are, in the former the protrusion and rise of the lips, and the narrow orifice left for the voice to escape.

But in the latter the lips are drawn somewhat closer to the incisors, and are wider apart. The teeth for these reasons differ in their relative positions, for while in *ĭ* they are almost on the same line, in *e* they are on different lines and a short space apart. In the modifications of *ĭ* referred to above, these distinctions do not hold good. The muscles most engaged are those of the tongue, lips, and jaws.

l.—This, a semivowel, is the only consonant in the alphabet, except the nasals, in which the voice is allowed to pass without arrest or impediment. But the space is so narrow, and the resonance of the sound in passing so great that it has led many to class it with the trilled *r*. There is, however, neither trill nor hum in this consonant, but greater resonance. The division of the vocal tube into two smaller, deflects and divides the voice, so that the resonance of both tongue and cheeks is more fully evoked, and it is this that has made *l* to be thought a trill. The tongue is in the *t* position, but contracted and bent downwards, yet not touching the lower incisors. The lips are open and relaxed, and the cheeks, instead of being drawn close to the molars, are apart from them, permitting the voice to escape through the intermediate spaces. If the hand of the learner is placed on the teacher's cheek he will feel the vibrations from the passing sound. If air also, instead of voice, is allowed to escape, the sound becomes aspirate, and resembles the Welsh *ll*, while it aids us to perceive more fully its vocal form. It is lower in pitch, for the glottis has yielded to the backward pressure of the tongue. Should the teacher find any difficulty in leading the learner to place his tongue properly, let him begin with the *ä* position of the organs, and show him the rise of his own tongue from this to the *t* place, then pronounce the sound with the learner's hands on the larynx and cheek. Touch is the best prompter in this difficult sound.

Reading.—The muscles engaged in *l* are the same as in *t*. But the *buccinator* (Fig. 17) expands the cheeks. The vibrations excited by the articulation of *l* are not very perceptible to the eye, and the positions of the organs so much like those of *ä*, that independently it can with difficulty be detected, unless from the position of the tongue if it can be seen between the teeth. But united with certain vowels, as *ä* in *la*, it is so different from kindred sounds that it can be read; but in *lē* the external indications of its presence are confessedly so limited, that it must be classed with a few other sounds which depend on their connection with others for their suggestion. Compared with *t*, *s*, etc., the incisors and lips are more apart. In such words as *lap*, *lip*, *lop*, etc., contrasted with *tap*, *sip*, *ship*, this difference is more apparent in the action of the jaw, and enough to guide the reader.

S.—This sound is sibilant or hissing, and very dependent on the disposition of the organs for its purity. The upper and lower incisors are brought close, almost into the same line, the lips drawn close to them by the retreat of the angles, and the tip of the tongue advanced till it almost touches the upper incisors and the gum. The sides of the tongue press against the molars to prevent any escape of the air unless through the narrow space in front left between its tip and the teeth. The muscular action required for *s* is considerable; first, that of the jaw upwards and forwards; second, in withdrawing the tongue to its right position, and in its pressure against the upper molars so that none of the air is allowed to escape over or under.

This is the pure sound of *s*, but there are alternatives, all more or less imperfect, as by placing the tip of the tongue against the lower incisors, then raising it till the back almost touches the gum above, and through the narrow space which intervenes the air if forced becomes sibilant. When the upper teeth are very wide apart, and the air more freely escapes, this form may be an improvement. However, it ought to be remembered that the sibilant sound is more dependent on the narrow space between the tip of the tongue and the gum for its correct form, than the setting or spacing of the teeth.

Reading.—The muscles employed are the *pterygoideus internus* (Fig. 18) and the *buccinator* for the advance of the jaw, and for retracting the angles of the lips, and the *depressor of the lower lip* (Fig. 17) for lowering the under lip. In consequence of the lower teeth being brought to the upper, the lower lip is somewhat contracted, and this increases the muscular action of the jaw and lips in retreating to the place of the vowel which may follow, as *sa*, *so*, *su*, *si*, etc., or when final as *os*, *us*, *as*, etc.

sh.—This is the second strong sibilant of our language It is formed on the palate, but not in the *t* place, for the tongue is raised rather to the *e* position, so that if this vowel is first pronounced, and then air substituted for voice, *sh* will follow, only the tip will rise a little nearer to the palate to secure the full sibilant form of the sound. In *s* the air is confined to a narrow space, but in *sh* spreads over the sides of the tongue also, and the sound gets its character from this diffusion of the current. The tongue is the chief agent in this sound. Its proper disposal is therefore essential. If it is not permitted to touch any of the teeth of the palatal cavity, except the rear molars, but brought near to them and the hard palate, the narrow space left between will suffice to create the sound. The back is not raised. The hand aids by detecting the difference of the currents of air in *s* and *sh.* A forcible expulsion may produce something like *sh* when the tongue is in another position, but it is better to avoid this, for it is not the right sound. The muscles chiefly employed are the *orbicularis oris*, *buccinator* and *depressor of the corner of the mouth* (Fig. 17).

Reading.—As the tongue is withdrawn somewhat in *sh*, the teeth are not on the same line, but the upper incisors are in advance of the lower and overlap them a little. The lips are also protruded in advance of the incisors, but the lower more than the upper. These are sufficiently distinctive signs to make this sound comparatively easy in lip-reading. Its union with long and short vowels brings out these traits still more fully.

Its articulation is an excellent muscular exercise, and its full expression a good indication of power on the part of the learner to use his vocal organs freely.

z.—Let voice take the place of the air in *s* and this buzzing consonant will be formed. But in the change from the sibilant to the buzzing sound the tongue will press closer and flatter to the gum to secure the full resonance. As *v* and *th* (*this*) are analogous the learner would obtain a better notion of its nature by repeating in succession the syllables, *va*, *tha*, *za*, then *fa*, *tha*, *sa*, till touch discriminates them. Failures in articulation often take place in these sounds, and therefore they ought to be thoroughly mastered. Sight is of little use here. To touch chiefly the function remains of discovering the peculiar vibrations of *z*, and therefore the hand of the learner ought to be called into active service. The plurals of nouns are distinguished by *s* and *z*, and as they are ever recurring, their correct articulation is necessary to the meaning.

Reading.—The positions of the teeth and lips as seen are well marked in *s* and in *z*, the closer pressure of the tongue on the gum in the latter leading to a similar action of the under-lip which presses more towards the upper and retreats somewhat, because the tongue also retreats higher on the palate. In other respects the positions are very much alike.

The differences of muscular action between the air and voice sounds to which *s* and *z* respectively belong, will be better appreciated by comparison. Taking first *f*, *th* (*thin*) and *s*, and then *v*, *th* (*this*) and *z*, it is evident that in the first three the lips and cheeks are braced more closely than in the last three, in which they are relaxed to promote the strong vibration. If a set of exercises were formed of these sounds first with long vowels, as *thought*, and afterwards with short, as *sit*, *san*, *thin*, *than*, it would be found that the eye of the learner would soon become familiar with most of them.

d.—This sound has the same relation to *b* that *t* has to *p*. It is formed on the *t* place, only on account of the nature of the sound as a vocal stop, the tongue presses on a larger surface and higher up on the gum and hard palate. The pressure is less than in *t*, to permit the resonance to be fully developed. In touching the larynx it will be found that while ascending in *ta*, it falls in *da* from the guttural nature of the sound, and rises to the pitch of *ä* as soon as *d* is uttered. The suggestions under *b* are suitable here, and if attended to there will be little difficulty with the sound. The arrested vocal form is the chief point, for the learner is in danger of letting the sound escape through the nose or unguarded parts of the mouth. *p* and *t* may suggest the stoppage of the sound in *d*, as they stop the air.

Reading.—The muscular actions in *t* and *d* are much alike, except in the difference already noticed between an air and voice stop. In *t* the tip of the tongue presses on the gum, and this permits the lips to be more apart than in *d* when it is pressed over a larger space to increase the resonance. This brings the lips more closely together and raises the angles, so that the *orbicularis oris*, *great zygomatic* and *masseter* (Fig. 17) are the muscles in most active use.

THIRD CLASS OF SOUNDS.

Gutturals.—k ; guttural ā, ă, ĕ, ĭ, ŏ, ŭ ; g, y, ng, g *(soft)*.

k.—The sounds of this division are either purely guttural, or so much affected by the leading gutturals, as to belong to them as a distinct class. The *k* position is the leading one, and when well learned renders the others much less difficult. Like *p* and *t*, it is an air stop, but formed by the posterior part of the tongue being pressed against the edge of the hard palate. For this purpose it is drawn backwards, raised, and rounded upwards till it touches the palate and closes the passage. If one hand of the learner is placed on his teacher's chin, and the other on his larynx, he will feel the double muscular action which this position of the tongue involves. Then if he removes his hand off the chin, and puts it before the lips, he will feel the explosion of the articulation, and at once learn that it resembles *p* and *t* in this respect. The other hand on the larynx will also inform him of its rapid descent from relaxing the engaged muscles. The danger of allowing the escape of the air through the nose is less here than in some other sounds, as *b*, because the *velum palati* is pressed up by the tongue. But the learner is not a stranger to this backward action of the tongue, Every time he swallows a kindred action takes place, and he never breathes through the mouth or through the nose without the rise or fall of the *velum palati*. Nature has, therefore, provided all the muscular energy and exercise that this sound specially requires for its articulation. Let him then swallow something and feel the movements of the tongue and larynx, then breathe alternately through mouth and nostrils till he is conscious of both, and he will have made the best preparation for the articulation of *k*. But should he not succeed after these suggestions, let him press the tip of his tongue againt the lower incisors till the back rises against the palate and stops the air. The pushing back of the tongue with the finger or spatula is not desirable, for it is not the learner's own voluntary muscular effort, but that of the teacher.

Reading.—The retreat of the jaw with the relative positions of the incisors, and the lips, and the jerk in the explosion, are the external indices of *k*, and enough to distinguish it from other consonants. A sharp, well-delivered *k* aids in the pronunciation of the guttural vowels.

Guttural Vowels.—*ā* in *cape* is guttural because it is preceded by *k*, and therefore it has been reserved till now. Any attempt to pronounce the *ā* in *pay* would fail, for the shift of the jaw to its place would require a greater muscular effort than it is capable of. Ease and convenience make it guttural.

ă in *cap*, *ŏ* in *cot*, and *ŭ* in *cut*, are of the same class. The first is usually classed with *ă* in *pat*, but incorrectly, for the organs are in different positions. Compare it with *ă*, *ĕ*, *ŏ*, *ŭ*, and it will soon appear that they differ, because the consonants with which they are united differ. In *ten* the tongue is in the *t* place, and, therefore, when dropped for *ĕ*, permits the free escape of the voice without any special muscular effort, but in *kept* it it in the *k* place, and the vowel *ĕ* becomes guttural because the muscular action is more facile. The same holds good of *ă* in *tap* compared with *cap*. The first is more open and full, the latter confined and rough. Were guttural *ŏ* and *ŭ* also compared in the same way, the same principle would be evident. These vowel sounds ought to be reserved till the guttural consonants which determine their peculiar forms are learned. In the same manner *ĭ* in *kick* is guttural from the position of the tongue.

As a final, *k* affects the preceding vowel almost as much as when it is initial. If such words as *sack*, *lock*, *book*, *tack*, *dock*, *sock*, *muck*, are pronounced, and the action of the organs carefully observed, it will be found that in anticipation of the final *k*, the jaw falls back to its position, and the vowel is either rendered guttural or much modified. But when the guttural *r* with initial *k* is final, then the vowel is evidently guttural, as *car*, *core*, *choir*, and these are our most guttural vowels.

Reading.—The initial or final *k* as now seen, gives these vowels a peculiar character, from the place and action of the jaw, as well as the position of the lips and quick retreat of their angles. In *lack* the lower lip is drawn close to the incisors, in *lock* the lips are rounded for *ŏ*, and in *puck* protruded for *ŭ*, but the movement from these positions in the direction of *k* is considerable, and therefore very favourable to lip-reading. In such words as *kine*, *cost*, and *cup*, the muscular movement, if represented by lines, would not only show great variety, but also striking differences. Such are the elements provided by Nature for advanced lip-reading.

g.—The place of the tongue in *k* prepares for this voice stop. Its correct sound has been anticipated in *b* and *d*, which ought to be repeated, and the learner reminded of their nature before he attempts *g*. As in *b* and *d* so also in *g*, the organs are more relaxed, and their contact broader to facilitate vibration. The tongue covers a larger space on the palate, and the pressure is much less than in *k*. Now, if the finger and thumb of the pupil are placed on each side of the throat above the teacher's thyroid cartilage, he will feel the vibrations which follow on the arrest of the voice. The voice in *g* is not likely to escape by the nose, any more than the air in *k*. Unless the resonance is well formed, *k* will become a substitute, and *g* fall out from the alphabet.

Reading.—Attention ought to be directed to the wider opening and greater depression of the lips in *g* than in *k*. By uniting it with the same vowels as *k* and pronouncing the syllables in varied order, their difference in muscular expression will be more apparent.

y.—This is the purest of all our semi-vowels. It is formed at the *k* place. The base of the tongue is moved still deeper into the cavity, but leaves a narrow space for the voice to escape, which vibrates considerably on account of its action on the tongue and soft palate. This can be felt by the learner if his hand is placed as in *g*. If the analogous vowels *ŭ*, *ĭ* and *ĕ* are first pronounced, and attention directed to the relative contiguity of the organs, the articulation of *y* may be suggested, but many scholars find it difficult. The teacher will observe that in *you* the tongue moves from the *y* to the *e* place, so that the vowel sound is prolonged and modified till it ends in *u*. However, this may be, for some time, too difficult for the learner.

Reading.—The buccal action is seen in the cheeks. The action of the *great zygomatic* and *buccinator* muscles (Fig. 17), the *middle constrictor of the pharynx* (Fig. 16), and the *stylo-hyoid* (Fig. 15) in the large withdrawal of the angles of the lips conjointly with the movements of the tongue, mark this consonant sufficiently for reading when united with vowels, as in *you*, *ye*, *yo*, *yah*, *yea*.

ng.—This is the last of the usual semi-vowels. The tongue occupies the *g* place, the mouth is left open, and the voice ascends through the nostrils, the *velum palati* having fallen to allow it to pass. This action will be much facilitated if preceded by the articulation of *m* and *n*, the finger of the learner being placed on the side of his teacher's nose, where the vibration is the greatest. In *m* the extra capacity of the cavity formed by the mouth, in which the voice resonates, adds to the nasal resonance. But owing to its guttural position *ng* lacks this advantage, and must therefore be well sounded to be made audible.

Errors principally arise from misplacing the tongue. Secure the proper position first, get the head well back, and the sound will follow the vocal effort. As it never precedes but always follows a vowel, as in *ang*, *eng*, *ing*, *ong*, *ung*, it would be well to collect the words of one syllable containing it and read them over till they are familiar. But the provincial error must be guarded against of adding another *g*, when there is a repetition of the sound, as in *sing-ging,* which is analogous but not correct. By keeping the repeated sound separate, as *sing-ing*, the tendency will be avoided or corrected.

Reading —Compared with other sounds in which the tongue is in the *k* place, *ng* differs from them in one important feature. As the vocal form of the sound does not require any special action in terminating, like *k* and *g*, the organs quietly resume their usual position. Because the sound is nasal the other organs, according to the law, tend to follow, and this gives the jaw such a movement that the molars almost meet. This is expressed in the cheeks and angles of the lips, providing good marks for reading. Its repetition in *singing*, *bringing*, is characteristic.

g (*soft*).—This is really a double consonant whose first element is *d*, and its second *zh*, as in *gin*. For the latter, if *sh* is treated like *z*, the sibilant is resolved into a humming sound by softly pressing the back of the tongue against the hard palate, and forcing the voice between them ; thus the hum is produced. In French it is a single consonant and pronounced softly, but preceded by *d*, the pressure is greater and the sound harder. If the approach is made from *f* and *v*, *th* (*thin*) and *th* (*this*), *s* and *z*, the analogy will suggest the relation of *sh* to *zh*.

Reading.—In *zh* the lips are apart and drawn back at the angles, but in soft *g* and *j* they are much closer, and protrude considerably. As a double consonant the latter will find its place in the next class.*

FOURTH CLASS OF SOUNDS.

j, ch, x, q, r.

With the exception of *r*, the consonants in this class are either double, or modified consonants and vowels already learned.

j.—This is phonetically a double consonant, consisting of the elements *d* and vocalized *sh*—*i.e.* *zh*—both of which have already been described. Both elements are palatal, and formed by the tip of the tongue against the gum ; but in the case of the second, the pressure in *d* is relaxed till the sound escapes in a humming form like *z*, only softer. The precise difference between these two sounds is that the element *zh* retains much of the sibilance arising from its position, while the element *d* is destitute of it. The so-called soft *g* has nothing to do with its hard form, either in place or manner of articulation, for the former is palatal and the latter guttural. Were our alphabet phonetic, *j* and soft *g* would be represented by one character, and hard *g* by another. In *hallelujah*, *y* takes the place of *j*, but this is from the origin of the word.

Reading.—The additional action of the tongue in relaxing from the *d* pressure, and rising along its back to the palate for the buzzing *zh*, effects a slight secondary movement of the lips, very perceptible in the lower. This is its only distinguishing expression from *d* ; but in combination with vowels, the movement of the lips is better developed, as in *John*, *James*. Compare these with *dawn* and *dames*, for confirmation of this analysis.

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* *g* (*soft*) and *j* have been substituted for *j* and *j* (as in *join*) in the descriptions in the original edition, which, being confusing, have also been amended, but without negativing Arnold's evident view that, although both are double consonants, the first is a simpler sound than the second.

ch.—This is a double consonant, *tsh*, as is evident in *Charles*, so that each element has at first only to be clearly and sharply articulated, and then quickly united. Under the head of Double Consonants, this union will be more fully treated. In some connections the *t* is not so clearly articulated, and sometimes *ch* is articulated as a single sound *sh*, as in *bench*, *machine*. In words derived from the classical languages, it is *k*, as *choler*, *chorus*, *chord*. Thus the same double consonant has three different phonetic values, which so destroy analogy, that each word in which it is used has to be taught independently to avoid mistakes in pronunciation.

Reading.—As *tsh*, the muscular action is compounded of *t* and *sh*, and is analogous to *j*, only the lower lip in *sh* takes a different form ; there is enough to distinguish it from *j* as in *chip* compared with *join*.

x.—This is also a double consonant, *ks*. From the guttural place of the first element, and dental place of the second, the muscular action in uniting them is very considerable, but as they are both air, and the first a stop, the explosion of *k* provides for the sibilant *s*. But like the sibilant, it becomes *z* in certain relations. Where it ends a syllable with the accent, as in *excellence*, or if the accent is on the next syllable when it begins with a consonant, as in *excuse*, it is *ks*. But when the accent is not on it, and it is followed by a vowel, as in *exempt*, *exist*, *example*, it is *kz*, and even then the *k* is almost *g*. Its lip-reading is simplified by its compound form, because the muscular action of both *k* and *s* or *z* is increased by their union, which gives rise to a most expressive movement.

q.—This is a double consonant *kw*. It is always followed by *u*, which becomes *w* from the action of the *k* sound. If *k* and then *w* are articulated apart, and afterwards combined, the learner will find no difficulty in this double consonant. The reading, too, is simplified by this union, for like *x*, the muscular action which it requires is both considerable and characteristic from the protrusion and form of the lips.

r (*guttural*), as in *work.*—This sound requires the fullest command of the organs for its correct articulation, and therefore it has been reserved till now. The letter *r* has three distinct phonetic forms, two of which are not so difficult as the third. These are the guttural and labial. The guttural is peculiar, and is effected by drawing back the tongue till it presses heavily against the epiglottis. This disposes the organs so that the voice in passing vibrates either the top of the epiglottis or the uvula. The former is the most likely, for there is nothing nasal in the sound. Meyer says that "it arises from the vibration of the uvula in a groove formed by a depression of the root of the tongue." This may be true of the French guttural *r*, but not of the English, whose seat is lower. The Germans have a palatal *r* formed by the vibration of the ridge of the tongue against the soft palate, but it is foreign to our language. Our guttural *r* is heard in such words as *lord*, *board*, *sword*, etc., but by most it is very imperfectly articulated, being displaced by a strong resonance, produced in the narrow space left for the passage of the air between the tongue and the palate. This is likely to be the guttural *r* of the future from its greater ease in articulation. As a final this is its usual form.

r (*labial*), as in *pray.*—This can hardly be called a distinct form, but rather a manner of introducing the trilled *r*, for when this is preceded by a labial as *p* or *b*, through a sort of attraction it introduces the trill which is fully developed in the palatal form. It exists in some languages as a purely labial *r*, disconnected from the palatal. But it may serve a useful end, in suggesting the nature of the trill. If the back of the hand is brought near the lips, and *pr* is forcibly articulated labially, the trill is perceptible, and then it can be shown that the tongue trills in the same manner against the palate.

r (*trilled* or *palatal*), as in *roll.*—The trilling is formed on the *t* place, generally on one side. The muscles employed are those at the base of the tongue to hold it firmly. Usually also it is pressed against the right molars for the same purpose. The trill itself is involuntary and an effect of the voice catching the apex of the tongue and compelling it to vibrate strongly against the gum. If these positions are observed the trill is quicker and better delivered. But some do not confine the action to one side of the tongue, but allow the whole apex to vibrate. This is the Italian form, and it is slower and softer than the other.

Again, others do not confine it to the apex, but allow a considerable part of the tongue to press against the palate, where it vibrates freely. This is an Irish form.

The learner, if not better instructed, starts with the design of producing the trill by voluntary muscular action, and of course fails. Better point out how he is to hold his tongue, approach the tip near the gum and then utter *ä* forcibly, and the proper trill may be imperfectly produced. This is likely at first, but once done it can be improved. The gargling of water in the throat, the vibrations of a slip of paper, are also suggestive of the right action. The hearty co-operation of the scholar will ensure success, but its absence render the best suggestions futile.

Reading.—When introduced by a labial or dental consonant, *r* can be easily detected, but when it is confined to the palate the lower lip vibrates, and this is still more evident when followed by a vowel, as in *roll*, *roast*, *rib*, *rust*, The lips too are more advanced at the angles, and assume almost the *u* form. In the guttural *r* the opening of the mouth, the withdrawal of the angles and the muscular action in combining it with another vowel or consonant are special; still it is one of those sounds which only a practised eye can detect.

Various Articulations. One of the most fruitful sources of the variations in speech-sounds is the defective state of our alphabet. A phonetic alphabet would provide for every sound, but when one letter has to do the service of two, and two that of one, with no guide but custom as to which is right, the learner who has no ear to guide him must ever be in danger of mistakes, if he pronounces his words from analogy. Every word must be learned if these are to be avoided. Some of these anomalies are here given, because they can be partly accounted for by the dynamical laws already illustrated.

b.—*b* is silent after *m* in the same syllable, as *lamb, limb, comb, dumb*. Evidently the difficulty of uniting two consonants so closely related in articulation, has led to this, for the voice has passed another way in the first. It is silent before *t* as in *doubt*, for a similar reason.

c, g.—Generally *c* and *g* are soft before *e*, *i*, but we have such exceptions as *sceptic* and *ocean* (*skeptik* and *oshan*); and in words of Saxon origin, *g* is hard, as *gear*, *geese*, *gift*, and many more. But when it ends a word or syllable *g* is also hard as in *rag*.

Before *y*, *g* is soft, as in *elegy*, but there are many exceptions of Saxon origin, as *bogey*.

It ought to be noted that when the termination *ng* of one syllable is followed by a vowel in the next syllable, *g* retains its own guttural value, as in *anger*. In the first syllable it contributes to the nasal *ng*, and in the second it is pure *g* in *ger*.

d.—In verbs ending in *ed*, if *d* or *t* precede, the full syllable is, from phonetic necessity, fully pronounced, as *added, hated*; but when preceded by an air-stop or aspirate, the *ed* is changed to *t*, as *stuffed* (*stuft*), *tripped* (*tript*), except in the solemn style; but when the consonant is a voice stop or humming consonant, as *b*, *g*, *z*, *v*, etc., it retains its voice sound, as *lived, buzzed*. On the same principle, when a verb ends in a liquid it retains its pure sound, as *ruled*, *joined*. Such combinations as *raspt*, *scratcht, bridld*, are very harsh, but still the whole termination must be changed, for they follow the general rule. The adjective, with few exceptions, retain the *ed*, as *learned*.

s.—Although a hissing sound, *s* does not always retain its character, for in the plurals of nouns, preceded by a vowel or a voice consonant, it is *z*, as *pens* (*penz*); *chairs* (*chairz*); *ribs* (*ribz*). Evidently it follows the mechanical law of greater facility. When verbs have to be distinguished from nouns, while they are spelled alike, they are pronounced differently, as *grease, greaze*; *abuse, abuze.*

Again *s* before *ion* becomes *zh*, as *evasion* (*evazyhun*); but in *expulsion* it is *shun.* The change of *t* into *sh* in the final *tion* seems very anomalous. Walker, the lexicographer, well observes of this, "Now the vowel which occasions this transition is the squeezed sound of *e* as heard in *y* consonant, which squeezed sound is a species of hiss; from the absence of accent it easily slides into *s*, and *s* easily into *sh*; thus mechanically is generated that hissing termination *tion*, which forms but one syllable as if written *shun.*" To this it may be added that *n* final seeks for the convenient *sh* as its precursor.

f.—In *f* and *s* before *t*, the *t* is assimilated, as *often* (*offen*), *castle* (*cassl*). There is also a strong tendency to change the *f* into *v*, confounding the plural with the genitive case, as in *wife's* (*wive's*)-*jointure.*

gh—In words beginning with this combination, *h* is dropped, as *ghost*; but at the end of words it is changed into *f*, as *laugh*, and sometimes into *k*, as *hough*, *lough*, taking the place of the guttural aspirate. In *ght* it is silent, as *flight*, *night*, *bought*. Here again it is the lapse of the guttural aspirate, which is still heard in Scotland.

k and **g** before *n*, **p** before *s*, and **w** before *r* are silent, as *knee*, *gnat*, *psalm*, *wrest*, *wrong*.

l.—*l* is mute in *almond*, *half*, and some others; also between *a* and *k* in the same syllable, as *chalk*, *talk*; also between *a* and *m*, as *alms*, *balm*. In *would*, *could*, *should*, it is suppressed, but takes the burden of *e* in *table*, *circle*, *able*, etc. In doubling *l* is partial, and has been much blamed in consequence.

Teachers know well that in pronouncing such words as *writing*, there is some difficulty in separating the final syllable, *ing*, from the *t* of the first syllable, because an additional muscular effort is required, but when pronounced *writ-ting*, this is avoided, and the articulation rendered unobjectionable. The same holds good of *travel-ler* and *travel-ling*. The rule that the consonant is doubled before *ing*, *el*, *er*, etc., when the accent is on the last syllable, except in the case of *l*, but remains single when it is on any preceding syllable is unsatisfactory, for a close analysis of all these words proves that in rapid speech the doubling actually occurs, or, what is tantamount, that the consonant of the prior syllable passes on to the final syllable, as in *travel-ling*, not all the consonant indeed, but its final movement which coalesces with *ing*.

r.—The palatal *r* usually begins a syllable, and the guttural ends it, as *roar*, *rare*, In dissyllables also this order prevails, as in *roller*, *railer*, etc.

re.—In a final unaccented syllable terminating in *re*, the *r* is pronounced after the *e* as *acre* (*aker*) ; *centre* (*center*). This is evidently for greater ease, for *kr* and *tr* are difficult to combine when final.

The combination of sounds in *onion*, *union*, *minion*, *pinion*, is peculiar, but presents no real difficulty if separated into syllables, thus, *ŭn-yŭn*, *yūn-yŭn*, etc. Now when these are referred to muscular convenience, it is seen that a nasal or some other semi-vowel precedes, making *y* more facile for articulation than *io*. Thus nature aids our work when art interposes its absurd anomalies in spelling. Let the teacher study his own organs well in their muscular action, and he will always be able to solve the difficulties created by our spelling.

Diphthongs.—Some of the diphthongs have been already noticed, but only as combined vowels, each retaining more or less its phonetic value. However, they rarely remain distinct in the composition of words, and are subject to mutual influences which modify their sound. They may be divided into three classes according to their phonetic value.

1. Those in which each vowel is heard either more or less, as *oy* in *boy*, *oi* in *boil*, *ou* in *hound*, *ow* in *fowl*.

2. Those in which one predominates, and the other is nearly absorbed, as *ei* in *either*, where *ē*, or if pronounced *īther*, *ī* predominates ; *ea* in *eagle*, *ē* ; *aw* in *law*, or *au* in *Paul*, *a̤* ; *ie* in *grief*, *ē* ; *ou* in *soul*, *ō* ; while

o absorbs *a* in *shoal* and *foal*; *ew* in *few* is resolved into *yu*; *ay* in *pay* into *ā*; *ao* in *gaol*, into *ā*.

3. Those in which they are pronounced apart—diæresis—as in *iodine*, *eolian*, *hyaline*, *naive*, *aerial*.

The vowels of the first class do not equally contribute to the syllables they unite in forming. There is an evident tendency for the stronger to absorb the weaker, or to yield to the consonant, as in the pronoun *I*—really *ae*—in which *e* prevails; and in *ou* in *house*, where *u* is the chief vowel sound. In *eider* *ī* predominates, but *ī* being itself a diphthong, the muscular action it requires reduces the value of *e*.

However, in all these diphthongs, neither vowel retains its own full tone, but is modified by the consonant for facility, as in *boy*, where the *o* after *b* has to yield to the vowel which follows some of its fulness. Sometimes it is only a compromise between both, as *ei* = *ā* in *eight*, and *ai* = guttural *ā* in *airy*. The following is a list of peculiar modifications:—

cean = *shan* in *ocean*.
ceous = *shus* in *farinaceous*.
cial = *shal* in *commercial*.
cian = *shan* in *optician*.
cious = *shus* in *ferocious*.
gious = *jus* in *religious*.

sial = *shal* in *controversial*.
sion = *shun* in *mansion*.
sion = *zhun* in *confusion*.
tial = *shal* in *martial*.
tion = *shun* in *nation*.
tious = *shus* in *sententious*.

The Syllable in Lip-Reading.—The syllable as the unit of muscular action in lip-reading may consist of a vowel; or a vowel and consonant, either before or after; or a vowel between two consonants; each of which presents a new form of musclar action, the last being a great advance on the others in force and fulness, so that the materials for a quicker and safer translation of these syllables into spoken language can be obtained. Numbers of them are oft-recurring and fixed elements, and their repetition would soon make them familiar to the eye.

Many of the strong verbs of the language are only monosyllables. They might be printed on a large sheet, and form an exercise in lip-reading, while memory treasured them for composition. In teaching them, the eye of the learner ought to be directed to the syllable as a whole formed of its several elements, so that they might not only be united as letters, but as sounds in the muscular changes their articulation involves, as we are in the habit of doing when we read. Let his eye become familiar with the whole syllable, as a set of motions, and thought will anticipate or divine the remainder.

The key words of the English speech-sounds, devised by Professor Melville Bell, will furnish a few illustrations of this principle.

1, One.
2, Two.
3, Three.
4, Four.
5, Five.
6, Six.
7, Seven.
8, Eight.
9, Book.
10, Watch.
11, Saw.
12, Feathers.
13, Tongs.
14, Whip.
15, Lamp.
16, Onions.
17, Boat.
18, Cart.
19, Tent.
20, Houses.
21, Dog.
22, Monkey.
23, Cage.
24, And.
25, Bird.
26, Canary.

Double and Treble Consonants.—Some languages abound in these; others have comparatively few. In some they are always pronounced apart, in others they coalesce into one continuous sound, as far as their elements will permit. There are many in our own language, and they form the chief difficulty to all children, but especially to the deaf, for they make great demands on muscular effort and quickness of movement. They have, therefore, been reserved till all the consonants, of which they are combinations, have been singly learned, and the organs have acquired sufficient mobility for greater efforts. The tendency is strong, at first, to interpose a vowel between them, as *pil* for *pl*, and where the organic shifts are considerable, as from *g* to *l*, its exclusion is most difficult, even for hearing children. When two consonants are situated between two vowels, a hiatus or pause is resorted to, and it is pronounced in two syllables instead of one, as *milder*, *mil-der.* A hiatus is inevitable with air consonants, as in *pits*, but if they are vocal, then the tone of the first passes on to the second, and there is no hiatus, as in *blow*, and the combination resembles that of two vowels in a diphthong. But, from the very nature of consonants, as stops or modifications of air and voice, this union is never so complete as in vowels. Three elements, therefore, determine the ease or difficulty of these combinations for the deaf.

I. *The degree of muscular effort.* Of this it may be noted that both consonants may be closely related in locality, and, therefore, little effort is required to shift the organs from one to the other, as *st*, in which *s* and *t* are both formed at the same point of the palate. A slight rise of the tongue is all that is required. But if *gl* is articulated, *g* and *l* are so far apart, and the muscular effort so very considerable, that to shift the action from the root of the tongue at *g* to its tip at *l*, cannot be executed so quickly as to exclude an intervening vowel. The latter combination must, therefore, be the more difficult for those who have not the ear to assist them.

II. *Their organic relations.* Proximity of place does not always secure facility of combination. The muscular effort between them may still be considerable, as from *t* to *l*, where the tongue retains its *t* position, but has to bend downwards in the middle of the back to let the voice pass on either side for *l*. But usually the closer they are related in place the less is the effort needed. The gutturals *gr* are formed side by side, and easily combine, but *str*, *spr*, *tr*, *br* and *sk* refuse to be so easily united, and a hiatus must intervene.

III. *The character of the sounds.* Facility of combination very much depends on the forms of the sound, whether they are air or voice stops, or aspirate, or nasal semi-vowels. Voice stops and semi-vowels combine better than air stops, because the voice is sustained between them, as in *dl*, *bl*, *gl*, as compared with *sp*, *st*, *sf*, *sk*. The former more resemble diphthongs, but the latter are only related in time, without any connecting link. If the first is an air and the second a vocal consonant, they may unite better, the one preparing for the other, as *pr*, *fr*, *tr*, *kr*, in regard to muscular effort, for the air of the first becomes the voice of the second, but no real combination has taken place. If *sm*, *sn* are carefully examined, they are found to be both difficult, for the *s* does not assist either nasal as a sound, and the muscular effort between is very considerable. As a rule these are among the most difficult for the scholar.

Final double and treble consonants. The number of initial treble and quadruple consonants is not so great as final, but the difficulty of combining the latter seems in practice not so great as if they were initial. The probable cause lies in the preceding vowel being arrested by the voice stop or nasal, as in *amble*, *ample*, *able*. In the second, *a* provides for *m*, and the consonants all stand in convenient relations. But such a combination as that in *sixths*, containing four consonants, *k*, *s*, *th*, *s*, is very formidable, even for well-trained organs. They are air stops and aspirates, and can only be articulated by introducing short pauses between, to permit the organs to shift to the next position. To start with such combinations, as some do, while the organs are still rigid, is an inversion of the natural order.

Dalgarno, in his Essay on Double Consonants, says, "The most natural and easy composition of consonants, either in the beginning or ending of a syllable, is that of the mutes and semi-mutes, following the sonorous letters of their own respective organs of formation, as in these examples; *mb*, lamb; *mp*, lamp; *nd*, hand; *nt*, ant; *ngg*, thing; *ngk*, think." This may be true for the hearing, but for the deaf organic facility, and the absence of the liability to conform the consonants to each other as vocal or aspirate is best for them, as *sp*.

The teacher soon finds out that these double consonants are better articulated when joined with a vowel than by themselves, and that this arises from the impetus given to the organs by the force exerted in articulating the vowel. The vowel, too, being usually the sound to which the double consonant is only initial or final, and on which the volume of voice is chiefly expended, there is a strong organic tendency to unite the consonants as closely as possible to economize the vocal effort for the vowel. This facilitates learning them.

In teaching all these consonants, they must be fairly articulated apart, before they are united, and this ought to be done at first slowly and then gradually accelerated, till their union is complete, without any sacrifice of their phonetic value. Visual imitation may assist when the sounds are labial, but when palatal or guttural, touch only can secure their correct articulation. It ought also to be remarked that our fine distinctions between these combinations of consonants are unknown to the deaf. Touch distinguishes the difference between air and voice, only from the presence of vibration in the latter, and not as the sound, by which we distinguish them. The muscular effort in their production, from the less to the more difficult, is, therefore, the principle that ought to determine the order in which they should be taught.

Lip-Reading. We have already assigned the syllable its place in speech and lip-reading; but only when made up of a vowel and a consonant, or two consonants separated by a vowel, and on account of the increase of the number of sounds, the range of the muscular action is enlarged, and the number of facial signs by which such syllables can be perceived is increased. But when double consonants initiate or end a syllable, or both, then the muscular action of the whole syllable is still more increased, and the reading rendered proportionally easier. In fact it may be stated as a rule, that the greater the muscular action required by one or several syllables forming a word, the greater is the facility in reading it if the eye is made familiar with their movements.

The value of these combined consonants for this purpose has been already stated and enforced, but now that nearly all the phonetic elements of the language have been taught, a little more attention may be devoted to the subject in its more advanced bearings.

The Articulation of Double Consonants. The following lists of final and initial double consonants are arranged in the order of their facility of articulation, with examples, which the teacher can easily add to.

I.—FINAL DOUBLE CONSONANTS.

ASPIRATE AND AIR STOP:—

— **sp**, asp, hasp, cusp, lisp, rasp, wasp, wisp, gasp.
— **st**, best, coast, dust, fast, last, gust, mist, nest, taste.
— **sk**, bask, cask, desk, dusk, mask, risk, task.
— **ft**, deft, left, loft, rift, soft, sift, swift.
— **sht**, (=-ed), clashed, dished, fished, gashed, rushed.

AIR STOP AND ASPIRATE:—

— **ps**, dips, caps, fops, lips, maps, wipes, sups, taps.
— **ts**, bats, dots, fates, gets, huts, vats, knits, meets, kites.
— **ks** (=x), backs, docks, box, coax, fox, six, rocks, flux.

SEMI-VOWEL AND AIR STOP:—

— **lp**, help, kelp, scalp, pulp, gulp.
— **lt**, belt, bolt, built, dolt, fault, felt, wilt, salt.
— **lk**, bulk, talc, hulk, milk, silk, sulk.
— **mp**, bump, damp, pomp, hemp, jump, camp, lump.
— **nt**, bent, dint, hunt, joint, count, lent, vent, want.
— **nk**, (=ngk?), bank, funk, hank, tank, sunk, link, rank.
— **rp**, harp, carp, warp, scarp.
— **rt**, cart, court, dirt, hart, sort, quart, pert, mart.
— **rk**, bark, dirk, fork, jerk, lurk, mark, Turk, park.

TWO SEMI-VOWELS:—

— **rl**, carl, dirl, furl, hurl, marl, pearl, whirl.
— **rm**, arm, barm, farm, firm, harm, germ, worm, term.
— **rn**, barn, born, burn, corn, darn, fern, yarn, warn, torn.

SEMI-VOWEL AND VOICE STOP.

— **ld**, bald, build, field, told, sold, pull*ed*, rail*ed*.
— **lb**, bulb, alb.
— **md** (= -ed), famed, hemmed, named, roamed, timed.
— **nd**, and, bend, find, hand, lend, rind, din*ed*, tun*ed*.
— **rb**, curb, orb, garb, herb.
— **rd**, bard, ford, gourd, hard, cord, pour*ed*, roar*ed*.

VOICE STOP AND SEMI-VOWEL:—

— **bl**, able, fable, stable, stubble, noble, trouble, bible.
— **dl**, addle, cradle, ladle, idle, riddle, saddle.
— **gl**, ogle, haggle, struggle, eagle, bugle, beagle.

TWO AIR STOPS:—

— **pt**, apt, a–dapt, a–dept, a–dopt, kept, wept, dipp*ed*.
— **kt** (= ed), baked, kicked, locked, liked, rocked, sucked.

SEMI-VOWEL AND FRICATIVE.

— **lf**, pelf, gulf, delf, sylph, golf, wolf, shelf.
— **lv**, twelve, salve, solve, valve.
— **rf**, scarf, serf, turf, scurf, surf.
— **rv**, carve, serve, nerve, verve, curve, starve.
— **ls**, (= lz), falls, feels, palls, rolls, and pulse and false.
— **lsh**, belch, milch, Welsh.
— **lth**, filth, health, tilth, wealth, stealth.
— **ns**, dance, dense, mince, pence, chance, once, tense, trance.
— **nth**, ninth, plinth, tenth.
— **rs** (= rz), bars, boars, doors, wears, and furze.
— **rs**, farce, gorse, purse, coarse, force, worse.
— **rth**, firth, fourth, forth, north, worth.
— **rsh**, harsh, marsh.
— **ms** (= mz), dames, bombs, foams, comes, times, James.

Fricative and Semi-vowel :—

— **fl**, trifle, raffle, scuffle, truffle, rifle.
— **sl** or — **zl**, tussle, tousle, dazzle, puzzle, bus(t)le, rus(t)le, mus(c)le.
— **sm** (= zm), chasm, chrism, spasm.

Two Aspirates :—

— **fth**, fifth, twelfth (*treble final*).

Voice Stop and Vocal Fricative :—

— **ds** (= dz), aids, beds, goods, lads, rides, and adze.
— **bs** (= bz), dubs, fobs, jibes, cubes, robs, robes.
— **gs** (= gz), bags, digs, fags, hugs, rogues, wigs, jugs, pegs.

Air Stop and Semi-vowel :—

— **kl**, buckle, cockle, fickle, knuckle, tackle, suckle.
— **tl**, battle, beetle, little, title, nettle, rattle, whittle.
— **pl**, couple, apple, dapple, nipple, cripple, triple.

II.—INITIAL DOUBLE CONSONANTS.

Aspirate and Air Stop :—

sp —, span, spar, spell, spin, spur, spout, spot.
st —, stab, stage, stall, stand, style, stun, step.
sc — or **sk** —, scale, sky, skate, scan, school, scot, scar.

Aspirate and Semi-vowel :—

fl —, flag, flare, flaw, flee, flash, fling, float, fly.
fr —, frail, fraud, freeze, fright, frisk, frog, frost, fry.
sl —, slab, slate, slave, sleep, slide, slip, slur, sloth.
sm —, smack, smell, smoke, smith, smash, smug.
sn —, snail, snarl, sneak, sneer, snipe, snore, snow.
shr —, shred, shrew, shrink, shrine, shrive, shroud, shrub.
sw —, swab, swim, swan, sweat, sweet, swift, swoop.
thr —, thrash, thread, three, thrice, throw, thrill, throat, thrust.

AIR STOP AND ASPIRATE :—

ch — (= tsh), chafe, chair, chip, cheer, chick, chop, chum.

TWO ASPIRATES :—

sph — (= sf), sphere, sphinx.

AIR STOP AND SEMI-VOWEL :—

pl —, place, plain, plait, plant, plead, plight, ply, plot.
pr —, pray, prey, pride, prod, prove, prune, prime, proud.
tr —, trace, train, tread, trial, trim, troop, trout, try.
tw —, twang, tweak, twice, twill, twine, twist.
cl — (= kl), clack, clap, clean, cliff, clime, cling, close, club, cloak.
cr — (= kr), crow, crew, crown, crush, crash, chrome, cross.

VOICE STOP AND SEMI-VOWEL :—

bl —, blade, blast, blaze, blind, block, blithe, bloom, blur.
br —, brag, bride, brave, brown, brute, broke, brim, bran.
dr —, drab, draw, dream, dry, drove, dress, drip, drug, drink.
gr —, grape, grand, green, grunt, grove, grief, groom, grin.
gl —, glade, glare, glen, glide, globe, glue, glaze, glint, glib.

SECTION IV.—MODULATION OF THE VOICE.

Syllables alone do not admit of much play of the voice, beyond the difference in their vowel sounds. As has been already proved, each of them has its own relative pitch, and if the position of the larynx and its control have been carefully attended to, absolute monotony is impossible. The scholar knows by touch that he can produce slow or quick vibrations by depressing or elevating his larynx, and the fundamental principle of vocal modulation is therefore known. Thought seeks to call attention to some of its expressions more than others, and for this accent and emphasis provide. The voice also lends itself to emotion by corresponding musical forms of tone and cadence. No doubt the ear is the chief conductor in these variations, but the parent force is mental. We speak as we think and feel. Although the deaf have not the ear to guide them, we can lead them to understand that they can make their voices take after their thoughts, and put life into the mechanical action of the organs of speech. The consciousness of this will be pleasing, and aid the teacher in his novel task.

Accent.—Accent is the more forcible utterance of a particular letter or syllable, by which it is distinguished from others. In the syllable itself, accent is of two kinds, one on the vowel and the other on the final consonant. When the vowel is long, as in *tone*, the accent is on the *o*, but when short, as in *ton*, on the *u*, from the rapid pronunciation required by the short vowel. This has been already learned, but it ought to receive constant attention, because it helps in the pronunciation of longer words. All words of more than one syllable are accented. In dissyllables the accent is generally on the first. If a few are selected, and in their utterance one finger of the scholar is placed on his teacher's larynx, and another on his own, he will perceive the increase of vocal and muscular force in the first syllable and its decrease in the second. If the accent is on a consonant, then it is sharper, with a slight rise in the voice on the preceding vowel; but if on a vowel its tone is fuller, with a perceptible rise. Compare *pup′pet* with *mótion*, and it is evident that the second permits of a richer play of the voice than the first, which ends in an air-stop, and, therefore, it would be well to begin with words in which the first syllable ends in a vowel, semivowel, or aspirate. Curved lines, ascending and descending, might be placed, the former over the first syllable to indicate the stronger tone, and the latter over the second to indicate the falling tone.

It need hardly be said that the one necessitates the other. The muscular effort employed in the accented syllable will be relaxed for ease in the second. But when the accented syllable has a long vowel before a final consonant, the vowel takes the accent, and the consonant participates in the fall of the last syllable. Compare *spoúting* with *spot'ting*. The accent on the *t* in the last is much stronger than in the first. In words of a number of syllables, in which the muscles need some relief after considerable effort, a second accent is introduced, in some instances because the word is a compound of others, which retain their own accents, as *ex-em'-pli-fi-cā̆''-tion*, or because muscular convenience requires it. Better, however, to attend at first to the principal accent, and when this is familiar refer to the other. The exercises on accent ought to be well directed on words of two syllables, as they are numerous in the language, and hence the tendency will grow to accentuate all such words on the first syllable. The exceptions may follow when language requires their distinctive meaning to be taught. In words of more than two syllables, it will assist the learner if the syllables are separated by hyphens, with that marked which bears the accent; and then the difference in accentuation between these and dissyllables pointed out, aided by the perception of touch. The manipulation of the larynx in pronouncing all these words, whether of two or more syllables, will reveal the fact that it is elevated on the accent in every one ending in a consonant; but that in those in which a vowel has the accent, the larynx acts in accord with the pitch of this vowel. The reason is obvious, from the greater muscular effort required by the consonant, while the vowel requires only an increase of lung force.

Emphasis. Accent is to syllables what emphasis is to words, phrases and sentences. (A.) In simple sentences it sometimes marks the word on which the speaker wishes to fix the attention of the hearer, but generally the emphasis is on the principal words, as the subject and the predicate, about which the others cluster, unless there is a special reason to the contrary. (B.) In sentences communicating some startling news it is placed on the words chiefly conveying it. (C.) In commanding, entreating, or praying, it is placed on the word or words which most convey the intention or desire. (D.) In negative sentences it falls on the negative adverbs. (E.) In interrogative sentences, on the term which suggests the required answer. (F.) In contrasted or antithetical words, phrases, or sentences, on the words which express the antithesis. Generally the other parts of the sentence are pitched on a lower key to permit the voice to ascend in the emphatic part. (G.) Quotations made to establish an opinion are usually more emphatic; and parenthetic words or sentences are spoken in a lower pitch, that the leading thought may be kept before the mind.

Emphasis is not a refinement in speech, but a distinction in thought, to which it gives expression, and to know its right use is to increase the ability to understand the logical relations of all the members of a sentence, or parts of a composition.

Rhythm. Prose has its rhythm as well as poetry, only more varied, for emphasis tends to rhythmic expression, as is evident in all well composed sentences where the balance of the members, the flow of their numbers, their completeness and terseness charm our ear. All great books, proverbs, and apt expressions abound in rhythm. We cannot get the deaf to appreciate it as we do, but we can get them to feel the march of the syllables and emphatic words.

In general there are words whose place is fixed, as the articles, adjectives, pronouns, and prepositions, with few exceptions.

There are also prepositions which become adverbial as complements to the sense, as *get up*, *sit down*, *lean to*, *be off*, which are invariably associated together in expressing the complex action. All these ought to be pronounced together in a characteristic manner so that sound and sense may chime in unison; but there are other combinations whose parts permit a pause to allow time for the renewal of the air in the lungs.

"A good book ‖ is the precious life-blood | of a master spirit | embalmed and treasured up ‖ on purpose | to a life beyond life." (*Milton.*) Here we can pause at *book*, then at *life-blood*, then at *spirit*, then at *treasured up*, then at *purpose*, and lastly at the close. The double lines mark the longer pauses. The first consists of three syllables, the next three six each, the fifth three, and the last six. "Not | that I loved Cæsar less ‖ but | that I loved Rome more," is a good example of a rhythmic arrangement of syllables.

(A.) At first it would be better to separate the subject from the predicate by a short pause, as *William | writes his lesson.*

(B.) When a word ends in a consonant, and the word which follows begins with a vowel, they ought to be united, as *get-up, put-it-in, take-it-out.* This will greatly assist lip-reading. Teachers know how difficult it is to pronounce *is* alone. This would be obviated considerably by combining it with other words, as *it-iz*, *he-iz*, *she-iz*, and familiarizing the eye with the muscular action.

(C.) There is also a disposition in easy talk to avoid the hiatus that occurs when one word ends and the next begins with a vowel, by dropping the vowel of the second, as :—

I am,	He is,	She is,	We are,	You are,	They are,
I'm.	*He's.*	*She's.*	*We're.*	*You're.*	*They're.*

Do not,	Shall not,	Will not,	May not,	Can not,
Don't.	*Shan't.*	*Won't.*	*Mayn't.*	*Can't.*

Could not,	Should not,
Couldn't.	*Shouldn't.*

While these forms, in the first instance, are written and taught in full, their abbreviated forms could be taught when the learner is able to distinguish the colloquial from the graver style of speaking.

Emotion. It has been already stated that the emotions influence the voice, so that it gives them appropriate expression. Joy or sorrow, pain or pleasure, indolence or earnestness, anger or patience, love or hatred, can be heard in its tones. It would appear that the connection between these mental states and the nervous system is so intimate, so responsive, that to think is to feel, and to feel is to think, when the subject is exciting. This intimacy brings the vocal organs into active play through the influence of the nerves. Sometimes the expression is explosive, as in fierce anger or great joy, and sometimes it takes a prolonged and rhythmic form, as in great sorrow.

The power over the organs of speech to give suitable expression to strong emotion is very considerable, for it seems to range over the scale, and produce effects unknown to ordinary speech.

Nor does it depend so much on the number of words, as the manner in which they are uttered. *O! Oh!* may be used in expressing surprise, pain, or joy, as *Oh, he is here! Oh, my foot! O! happy day!* But the manner or force with which each is uttered differs rather than the pitch. In a similar way *Ah!* and *Ha!* express satisfaction, astonishment, and displeasure, as *Ah, I have caught you! Ha, I expected it!*

Alas! Woe! are expressive of sorrow, as *Alas, I have lost a son! Woe is me!*

Bravo! expresses sudden approbation.

Halloa! is used to arrest or invite attention.

Hush! expresses sudden desire to suppress some word or noise made by another.

Hurrah! expresses sudden joy in a masculine form.

In addition to these there are imperative forms, as *Stop, thief! Take care! Come along! Stand back!* etc., which express strong emotion, fear, or anxiety, and whose utterance is marked by intensity.

If the exercises on these exclamations could be conducted in harmony with the different emotions they excite in those who actually feel them, the muscles of the glottis would be strengthened, at the same time that the learner would appreciate a little of the rhythm of speech. Our scholars ought to be able to use their voices in expressing their emotions, as we do, in these interjectional forms, for they are an elementary part of language. Not, however, by overstepping the modesty of Nature, and splitting their own voices, and the ears of all about with barbarous noises, but by a more intense expression of the proper vowel sounds. Nature has prompted and trained us to use these forms; let us consult her closely in teaching the deaf to imitate us. The real always surpasses the mimic in education.

Poetry. Though poetry may seem less fitted than prose to exercise the vocal organs of the deaf, on account of its musical structure, yet it is far superior, for the feet or bars of which it is built up are measured by time and movement. Its rhythmic form is, in fact, due to recurrent undulations of similar lengths of sound which please the ear, and may be made apparent to the eye by the bâton or the hands as regulated motion. Hence, poetry finds in music its highest expression. The deaf can appreciate poetry by two of their senses. They can measure the bars by the time spent in their expression; and the long and the short, the twos and the threes, the strong and the weak, the high and the ow, can be felt, and the time spent in their utterance measured by the beats of the bâton or hand, or the tread of the foot. Associate these with the reading of poetry, and it will possibly be seen that the scholars enter with spirit into the exercise. If they are also taught to recite some pieces of poetry, and suit the action to the word, they will also put into the voice some of the buoyant feelings excited by the thought. Accent, emphasis, and modulation, all find their place, and are best illustrated in poetry; and the rhythmic recurrence of the emphatic syllable leads to the increase in the volume of voice or force of articulation, which assists the organs to still greater efforts in modulation. If we remember we have to deal with muscular action capable of being stimulated to the utterance of every sound heard in fine speaking, we have only to provide the right stimulus to free the voices of our scholars from the dull monotony so often complained of. Poetry provides us with one of our best expedients. But while it may thus be made a means to a free and natural use of speech, it would be useless to trouble the deaf with the minute refinements of prosody, which has been borrowed from the classics, and is hardly fitted to our language, for we do not read by the " longs " and the " shorts " so much as by accents.

[REFERENCES. Stone, *Elementary Lessons on Sound*, London, 1895; Helmholtz, *Sensations of Tone*, London, 1875; M'Kendrick and Snodgrass, *The Physiology of the Senses*, London, 1898; J. Gavarret, *Phenoménès Physiques de la Phonation, et de l'Audition*, Paris, 1897; M. E. Gellé, *L'Audition et ses Organs* (Bibliotheque Scientifique Internationale), Paris; Carl Ludwig Merkel, *Anatomie und Physiologie des menschlichen Stimm-und Sprach-organs (Anthropophonik)*, Leipzig, 1857; *Physiologie der menslichen Sprache (Physiologische Laletik)*, Leipzig, 1866 (the standard authority—the second work is smaller and contains plates with sections illustrating the organic positions in articulation); G. Hermann von Meyer, *The Organs of Speech* (International Scientific Series), London, 1883 (indispensable); J. Vatter, *Die Ausbildung des Taubstummen in der Lautsprache*, I. Teil: *Das Technische (mechanische) Sprechen*, Frankfurt a. M. (the principal German work); L. Goguillot, *Comment on fait parler les Sourds-Muets*, Paris, 1889 (an excellent work, with fine illustrations of the relative positions of teacher and pupil in learning to speak, and sections of the organic positions in articulation); Arnold, *A Method of teaching the deaf and dumb Speech, Lip-reading and Language*, London, 1881 (superseded by his Teacher's Manual, but contains sections of the organic positions in articulation), *Lip-reading*, Northampton, 1892; Samuel Porter, *Guide to Pronunciation* (in Webster's Dictionary, new edition, 1900); Ogilvie's *English Dictionary* (any recent edition, *e g.* Annandale's); A. Melville Bell, *University Lectures on Phonetics*, New York; Brown and Behnke, *Voice, Song, and Speech*; Articles on *Phonetics, Voice, Sound*, etc., in *Encyclopædia Brittanica*, ninth edition, or Chambers' *Encyclopædia*; *American Annals of the Deaf*; *Revue Internationale de l'Education des Sourds-Muets.*]

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Book IV.

LANGUAGE.

CHAPTER I.—Methods of Teaching Language.

Introductory.—We have seen that speech can be taught as a purely muscular exercise of the vocal organs, without the cognition of a single known word, for there is nothing magical in sounds which tells their meaning, nor any connate resemblance which leads from the one to the other. Their union is arbitrary, and subsists because sound is the best known means for expressing thought. To teach language is to bring about this union of thought and sound as speedily and efficiently as possible. Had the deaf heard this would have been done for them at home, but being deaf, articulate sound has no place in their sensations, and therefore no associating process is possible till they are taught to speak artificially. Now as hearing children learn by hearing the names of things spoken, and imitating them when they are actually seen or used, so must the deaf be taught to apply names in the same manner. The problem for solution therefore is—How can this process of associating thought and language be most conveniently and efficiently effected? Or, otherwise expressed,

(I.) What is the best method of teaching language to the deaf?

(II.) How can it be best applied?

The answer usually given to the first of these questions is, employ the Natural or Mother's Method, which means that as intelligent parents teach language to their hearing children, so ought the deaf to be taught.

The method itself is natural, simple, direct, and well adapted to the capacity and strength of the child. All the relations, circumstances, and occasions of domestic life, furnish the matter of the first lessons. As a mother has minds to instruct, and hearts to gratify, she unreservedly devotes her best powers to the discharge of this noblest of her services. Her pupils are not troubled with grammar and composition. Life both in and out of doors—the flowers, streams, woods, hills, the town with all the wonders of the shops and markets are talked of. To amuse, astonish, and delight are the mother's best means of provoking inquiry. A thousand questions are asked, and as readily answered, for curiosity is potent in children and is her best helper. Then as occasions for their repetition are ever recurring, the learning of language is constantly advancing through use and habit, till in a couple of years enough is known to enable the children to enter on elementary studies. No better method can be imagined. But can it be employed with the same facility and efficacy for the deaf? No, for the conditions are different, and necessitate a different procedure. A deaf child does not, and cannot learn language like a hearing child. His mother cannot deal with him as with her other children.

It is in fact hardly possible to instruct him like a hearing child, for he is destitute of the impressions left by often hearing words with their order, accents, and intonations, before the teaching of speech is attempted. He has no recipient sense of sound. He knows nothing of the direct relations of the names to their objects as perceived by a hearing child who can at once imitate and apply them, but when the name of an object is uttered by the teacher, and repeated by the deaf learner, it has no meaning to him till associated with that object, by pointing to it, or in some other manner which will unite them in conception and memory. Word by word, sentence by sentence, has to be taught in this manner, till a vocabulary has been collected, and a sufficient knowledge of the simplest elements of construction imparted to permit the teacher to talk to his deaf scholars as a mother does to her little children. A special course of lessons has, therefore, to be constructed to meet the changed conditions. Considerable differences exist among teachers, both in opinion and practice, as to the form these lessons should take in adaptation to the special mental and physical relations of the scholar to spoken language.

Methods.—In the history of the methods of teaching language used by oral teachers, these three—the grammatical, pictorial, including reading, and natural or intuitive—are the principal ; all others are either modifications or combinations of these. But before proceeding to state and examine these methods, it is desirable to ascertain the ends we seek to attain in the teaching of language. They are :—

(1) To provide the scholar with a copious vocabulary of words for the purposes of thought, so that its expression may be full and correct.

(2) To familiarise him with the order in which the language has placed them in composition, so that he may be able to think and speak in precisely the same order as others do.

(3) To make the method of acquiring language promote, as much as possible, the development of his understanding, and the exercise of all his mental powers.

The validity of these ends is obvious. Without a very extensive knowledge of the names of objects, actions and their relations, thought and intercourse would be impossible. They are the very materials or stuff out of which language is framed. The second end commends itself to every thoughtful teacher, for if the words are not in the same order, but by chance inverted or displaced, then their relations are lost, and their precise meaning, both in thought and expression, remains undiscoverable. Language is a matter of order as well as of naming. This is allowed, but strangely ignored when signs, as the instrument of thought, are brought into comparison with speech.

The Formal or Grammatical Method. This was the first method of teaching language. This was most likely due to the scholastic training of the early masters, and their limited knowledge of the precise conditions and requirements of their work. It seems strange to us that they did not perceive that a grammatical method was not adapted to one who was ignorant of the very elements of the thought and speech on which grammar is founded. But let it not be supposed that they began with the rules of grammar. They were not such simpletons. What they really did was to begin and proceed in the etymological order of the parts of speech as set forth in the Grammars of the time. This order, as followed by Bonet, Wallis, and de l'Epée, did not aim at putting the scholar in possession of language by a logical development of the sentence, but made him acquainted with its parts in all their accidents preparatory to uniting them into propositions. It was therefore the inversion of the natural method which makes memory the minister of reason. The tendency was thus to teach language in its analytic rather than its synthetic form. The materials were either collected or distributed, but the building of them into language was reserved. No affirmation or act of reason, in the form of a proposition, was taught till all that precedes the verb *to be* was learned.

This method was found to be artificial and fragmentary; and, while exercising the memory, did little or nothing for the understanding, and was therefore unfitted to the condition and wants of the deaf. Art took the place of nature, and the scholar was treated more like a machine, through which language could be ground, than a being endowed with mental powers to whom it ought to be given for their exercise and development.

The Pictorial and Reading Method. This method, originated by Moritz Hill, was undoubtedly, in some respects, a great advance in the right direction. In principle it adopted the mother's method; but, instead of the actual objects, events, and circumstances, which provide the mother with the materials from which she draws her lessons, pictures of the principal objects and scenes which attract the eye in daily life were designed, and on these a series of graduated lessons constructed, in which everything expressed by these pictures is clearly, simply, and forcibly taught, first by the exposition of every new term, and then by a series of apt interrogations with exercises in collecting similar terms. It is thorough as far as it goes, and the scholar who learns it must acquire, not only a considerable vocabulary, but numbers of the forms of speech required for life. But pictures are objected to on these grounds:—

(1) They are not real and actual, but ideal and factitious. They are seen, not by the eyes of the scholar, but through the eyes of the artist. They are not the real objects or actions, but their lifeless images. This is not in harmony with the principle that the direct intuitive perception should be received from the object, as Nature has it, not from its image.

(2) A picture is inevitably limited to one moment of time. It has neither past nor future, unless supplied by history and reflection—of whose possession the deaf-mute is almost destitute—and therefore it fails in the actual progress, change, and variety of the scenes of active life of which the mother of the hearing child is always availing herself. The attempt to teach a hearing infant by pictures, to the exclusion almost of the real, would prove a failure, if it were carried out.

(3) No matter how well they may be designed, or how numerous they may be, pictures do not and cannot cover the whole field of the actual, but leave untouched numbers of the most familiar objects and stirring events quite as important to a knowledge of language. They also fail to convey ideas of the relations of time past, present and future.

Pictures therefore fail in some of the most essential elements of language, and ought not to be made the principal medium for teaching it to the deaf. Nature surpasses all her counterfeits, and we teach best when we bring the minds of our scholars into close living touch with her by means of objects and actions.

Still, pictures are useful to represent objects and scenes which are foreign to the school or neighbourhood; but, beyond this they ought not to fill a larger place than they do in the education of hearing children.

THE NATURAL, INTUITIVE, AND LOGICAL METHOD.—If the manner in which a hearing child learns language, as already described, is carefully considered, the meaning of these terms will become clear.

(1) It sees and becomes familiar with the objects and acts of the persons that surround it. It hears their names and imitates them till it can also use them for ordinary purposes.

(2) Its perceptions of them are therefore natural, direct, or *intuitive*, as De Gerando defines it: "There are two kinds of intuition; the one which we call *real*, the other which we call *rational*. By the first, the mind perceives, immediately and directly, that which really exists; this is the intuition of things or their images. By the second the mind perceives the conditions and relations of the ideas which it originates; this is logical and reflective intuition, by which the mind gives account of that which it thinks." Our use of the term is at present the first of these.

(3) The method is logical, because not names only, but names as elements of sentences are learned, so that reason, as well as perception and memory, is exercised from the first.

Most of the German teachers, chiefly Vatter, have applied this method more or less fully. Yet it does not satisfy a large number of teachers, on the ground that it is not consistent with itself; since while admitting the logical structure of every sentence, it does not develop its subject and predicate systematically in the process of teaching language, until the materials are sufficiently accumulated before directing the learner's attention to grammatical relations. They say, if the structure of every sentence is logical in its simplest, as well as in its most elaborate form, why not, from the first, unite the collecting of materials, *i.e.* the forming of a vocabulary, with the logical development of the sentence, so that the elements of the subject and predicate shall be learned in their living relations, and reason at the same time cultivated in the process?

But, besides this, there is a point of no small importance touching the exact manner in which the course of elementary lessons shall be taught. Since signs are excluded and pictures are defective, how shall we proceed to name acts as well as objects, so that the learner may obtain an intuitive perception of them? The question can be answered best by referring to the manner in which hearing children learn to name them. The fact is, they see them, and have a direct perception of them. Nature makes no difference between acts and objects. Both are alike real, only the one is matter, and the other motion. Now, if this part of the mother's method is also to be imitated, the deaf should be taught, as far as practicable, in the same manner. There is a still greater inducement to employ this realistic method, for it is on the lines of the signs in which the deaf delight; but free from their linguistic abuses. The characteristic features of signs, motion and action, can both be enlisted in teaching language, but instead of associating actions with natural signs we associate them with their names, and hence the mental relation of the learner to them is precisely the same as if he heard. And then the meaning and logical relations of the different elements of the sentence can be best exhibited by action.

This intuitive and logical method is not grammatical, but founded on the simple sentence or proposition, as the fundamental affirmation of all thought, developed in all its forms and relations, till the structure of the language is learned as well as its vocabulary.

It is objected to this method that it is the old grammatical method in a new dress, and not the mother's method, but a tedious, complex and difficult logical method which occupies the time of the learner to the exclusion of a more practical and efficient one of teaching language. This is an unsustained charge, for it ignores the fact that the deaf cannot be taught exactly like other children. Deafness has removed them from the conditions of the hearing, and they must be taught both speech and language artificially, by a well-constructed series of lessons. The practical point is as to the principle on which they shall be constructed. Will it suffice to provide the scholar with a course of lessons in which no special provision is made to put him in possession of the logical structure of the language, or to adopt one which, while providing for this, does not neglect mental development? Surely the latter commends itself most to those who wish to make language also an instrument of mental culture. But neither is neglected in our method.

Reading books of graduated lessons have been so devised that nearly all the forms of speech, and all the words used in common conversation, and found in the literature of the country, can be read and learned through the exercises constructed on them. But the question may still be asked, May not the object aimed at be more effectively secured by a series of graduated lessons on all the forms of words and principles of construction, whereby each shall be dealt with in the clearest manner, so that the learner's mind may be able to grasp them in their logical relations as seen in every member of the sentence? Or could this be done better in the ordinary reading lesson? We think not, for a reading lesson is made up of many sentences, and has a special interest of its own to which they all contribute. It therefore does not so well deal with the logical structure as lessons written exclusively for its illustration. A well-constructed reading book is an excellent auxiliary, but it is better to turn to it with minds prepared to catch the meaning, when new words only have to be taught. By all means let reading-books as wide as the language in their range be prepared, but let the minds of our scholars be first trained to think and reason by the education which the logical study of language will most assuredly provide.

If we can take play into our service and make the lesson almost a game, by little tableaux which teach names and acts at the same time, let it by all means be done, for the deaf, of all children, have most need to be roused and animated.

Valuable as object teaching is, action is still more so. Now, in language the *Verb* is the expression of motion or action, and when joined to a noun, constitutes a sentence or proposition, as *The bird flies.* This is an affirmation of reason ; the living, mental association of the act with the actor as perceived and with the words which express it. Objects and their motions can be seen apart as percepts, but when we affirm the one of the other, as *The dog runs,* we reflect, compare, unite and affirm, and it becomes a concept. When we can get a deaf-mute to perceive, affirm and pronounce the words which describe an act, his mental development has begun.

A hearing child has almost unlimited opportunities of learning language from the uninterrupted flow of conversation about him, much of which, though not intended directly for himself, yet interests and instructs him. As Lloyd Morgan has it, he grows up in an atmosphere of language. But a deaf-mute, for the first two years at least, is almost wholly dependent on his teacher for his lessons, and the time devoted to the direct teaching of language is not more than an hour or two daily. The other lessons may add to his vocabulary, but do little for his real progress in language. Besides, hearing children begin to learn language as soon as they can speak, while a deaf-mute usually begins, it may be, at five, but more frequently at seven or eight years of age, when the most prolific period for acquisition has passed away, so that the labour of learning is increased greatly. We cannot afford to wait for the occasions of daily life, which a mother finds to teach her child, for the limited time and hard conditions in which we have to work render it a duty to find out the best and quickest method to put the deaf in full possession of the instrument of language which is the key of knowledge. We must, therefore, anticipate nature, in collecting and arranging objects and incidents, invent-ing and arraying others which will set forth the principal phases of this manifold life, and all this in the form best adapted to the capacity and disposition of our scholars. There is no method which has been found so efficient for the purpose as the logical and intuitive, which we shall now explain.

Everything depends on a right method in the hands of a competent teacher, for in no other kind of education is method so productive of good or bad results as in teaching language orally to the deaf. But, as nature is the same in the deaf as in the hearing, the general principles of educational psychology are, with some modifications, equally applicable to the former. These principles are best stated by Herbert Spencer in his *Education; Intellectual, Moral and Physical.* They are:—

1. That in education we should proceed from the simple to the complex.

2. The development of the mind, as well as all other development, is an advance from the indefinite to the definite.

3. Our lessons ought to start from the concrete and end in the abstract.

4. The education of the child must accord both in mode and arrangement with the education of mankind, considered historically.

5. In each branch of instruction we ought to proceed from the empirical to the rational.

6. In education the process of self-development should be encouraged to the uttermost.

7. As a final test by which to judge any plan of culture [or education] should come the question, Does it create a pleasurable excitement in the pupils?

The fourth is practically useless, since it is already expressed by implication. With these principles we generally agree. They are acted upon by the best educators; but it must be candidly confessed that the test of the last rule would hardly be satisfied in teaching speech to the deaf, and were it to hold, the work must be abandoned. We know full well all the difficulties that make oral teaching at first disagreeable to both teacher and scholar, but we are so convinced of the superiority of speech over all other means in mental education, that we are willing to endure them for a time rather than abandon our pupils to a defective method. Let the deaf be taught to speak, and then Herbert Spencer's test question will ultimately find a satisfactory answer.

The Gouin Method of learning foreign languages. In the past many attempts have been made to teach languages other than the vernacular by methods which aimed at reproducing as nearly as possible the conditions in which a child naturally acquires its vernacular. Most of them have had their day, but one of the more recent, that invented by Francois Gouin, and explained in his *Art of Teaching and Studying Languages*, deserves a passing notice from its obvious resemblance to what has been attempted in the case of the deaf. Gouin discovered no new principle, but made a practical application of the old, but seldom practised, theory that Nature ought to be followed in the teaching of language. The following is taken from the *American Annals*, vol. 38 :—

"The principles that lie at the foundation of Gouin's system are briefly,—

1. Children learn language by sentences, not by words.
2. The verb is the soul of the sentence, and on it the attention must be centred.
3. The child pictures the actions in a sentence corresponding to their natural succession in time.
4. The idea, the concept, must always be in the mind of the child before the language to express it can be taught.

He divides all language into three parts :

1. Objective language—the expression of the phenomena seen by us in the external world.
2. Subjective language—the expression of the play of our inner faculties.
3. Figurative language—the expression of the purely ideal, by means of symbols borrowed from the external world. He teaches language by what he calls 'series.' Nature is divided into the following parts : the man, quadruped, bird, reptile, insect, plant, elements ; and upon this basis he arranges a number of 'general series,' each of which is divided into fifty or sixty smaller ones, and these again into 'themes.'"

There is undoubtedly much in Gouin's method that is eminently suggestive and useful from the point of view of the teacher of the deaf, but at the same time the extreme minuteness of detail with which natural actions are described in the illustrative examples is hardly suited to the special conditions and requirements of the deaf, and may even defeat the very object aimed at by creating a sequence of ideas and modes of expression which have no existence in real life.

CHAPTER II.—The Natural, Intuitive and Logical Method.

As already stated, the sentence or proposition in its simplest form is the foundation of our method, because it is at once natural, intuitive, and rational, and can be taught with the greatest facility.

In teaching, the subject and action should be before the learner, so that he may perceive them, pronounce their names as a sentence after the teacher, and then by himself till they are associated in his memory, so that when the subject and action are again seen their names are at once suggested and can be repeated.

If the name of the subject, who is present, is well known, he has only to be told to do some simple act, as walk, stand, run, etc., and if ignorant of this, then it may be illustrated by one already familiar with it, and on repeating the command the other will at once obey.

Upon the whole it is better for the teacher himself to set the example and pronounce the verb. At the same time let him tell the scholar to do the action, as *Tom, walk;* but if he fails to comprehend the meaning, repeat the process with an older scholar, emphasising the verb, and it will be imitated by the learner.

To associate them closely in the memory of the learner, the words ought to be pronounced by the teacher apart from the action, and if their meaning has been forgotten, the action repeated till the association is perfected. Then the words will lead to the action, or the action suggest the words.

Where writing is used the words ought to be written on the black-board or slate and associated with their pronunciation and the action, till, when seen on the board, all three elements are at once remembered.

This procedure is the same in principle as that unconsciously used by the mother in teaching her hearing child, only adapted to the conditions imposed by deafness. It gives a direct mental perception of the material elements of the proposition as seen at the moment, and then of the words to express it as spoken by the teacher and repeated by the learner. Thus thought and language are made one, and his knowledge and use of the language of speech is the same as our own; for by reading the words on our lips when we pronounce them he reads them also as our thought.

The principles on which the method is founded may be very briefly summed up as being these—

First: to employ a definite action, seen and known by the learner, which a simple sentence will describe.

Secondly: to speak the words of this sentence so that the learner can see and repeat them in association with the action, and know that they are descriptive of it.

Thirdly: to make the learner repeat and write them till their mutual association is so complete that when the words are seen or read the action is immediately suggested, or when the action is seen the words are recalled.

A word of caution as to actions. They should be real, and not as in pantomime, mere imitations, else they will inevitably degenerate into signs.

SECTION I.—THE SIMPLE PROPOSITION OR SENTENCE.

All language centres in the sentence. Every thought takes this shape. It is the logical unity. It may be simple, complex, or compound, but whatever its form, every word or phrase used in its construction enters into this unity. It may be described as a mental act corresponding to the material act which is perceived and described.

The *simple sentence* consists of a Subject and a Predicate, or an agent, and what he does, or what he is.

The *Subject* may consist of one or more persons or things and be modified or completed by other words or phrases, but still having a certain completeness.

The *Predicate* is the word which states the action done by the subject, or affirms something of him; and while agreeing with the subject in some of its relations, differs from it as an act in time, place, manner, and circumstance, which require modifying forms, words, and phrases, but whatever these may be they are regarded as united in forming the predicate.

But it ought to be carefully noted at this point that not all predicates are formed of verbs of action, but that quite as many are formed by verbs that affirm the identity or similarity of the predicate and subject. In the following exposition these two classes of verbs will be treated apart, but as verbs of action best arrest attention, and are the easiest to comprehend, they will have the preference.

Of course it is understood that the logical and grammatical terms used throughout are not intended for the learner—at any rate until the study of grammar is taken up—but only to explain to the teacher the method more clearly, and to assist him in its practical application. They are only the scaffolding of the building. The teaching of language must not be confounded with that of grammar. As a recent writer says, "by developing the sentence on the logical method, we obtain the advantages of grammar without its technicalities."

Application of the Method. In many schools the names of objects present in the room are taught with a view to forming a vocabulary, before entering on the real work of teaching language.

But this is objectionable, for the impressions already made by objects on the minds of the learner are not those of separate and unattached things, like a heap of stones, but as related to other objects. To teach them apart is therefore to separate them from what may be called the natural and logical connection in which they are perceived. No doubt in teaching articulation, many simple words have been learned, but they include verbs as well as nouns, and have had only a passing reference made to them. Now that spoken language has to be taught, better at once to adopt the mother's method, and teach words as sentences, expressive of what is seen and done. And further, children are much more attracted and impressed by things in motion than at rest, so that their names are more readily learned and remembered. But the process must be gradual, leading on from the simple to the complex, and from the concrete to the abstract.

As the *verb* is the word which expresses life and action, it should at once be associated with a subject which will give effect to it with the vivacity that makes learning a pleasure. Sitting still, or standing before the black-board, or looking at a picture has little life or interest in it. The scholars should move about freely, and do or see done what is commanded or repeated in action. Verbs of action are of two classes, *transitive* and *intransitive;* but the latter is the better for primary lessons, because the action is confined to the subject.

Intransitive Verbs. 1. PERSONS.—If the names of the scholars in a class are familiar to themselves, as they ought to be, then such verbs as *stand*, *walk*, *run*, *leap*, *spring*, *bound, ride, go*, *come, dance, turn, twist, smile, laugh, cry, speak, cough, whisper, breathe, sniff*, *blow, puff, shout, hiss, moan,* etc., can all be taught by commanding; as, *T—— stand; L—— walk; G—— leap*, etc., till they are all learned in the manner described above. Nor should the commands be confined to the teacher. The scholars ought to take his place, and give the same commands to one another. The value of speech is soon discovered by this exercise and lip-reading improved. After learning them by speech only they should be written, and the sounds associated with the written characters.

Nouns only are used as subjects. But they differ in person. The one who commands is in the *first* person, and the one commanded in the *second.* The *third* person can be introduced by stating what another does, as, *T—— leaps; J—— blows;* and to get this done the command may first be given to another. The intransitive verb answers this purpose better than the transitive, on account of the nature of its action.

The time spent in perfecting these exercises will be far from lost, for they originate a manner of looking at things and a mental habit in conformity with the order of the words and their logical connection. When any one is afterwards seen doing an act the mental affirmation will correspond, as *J—— rides,* etc.

The plural can be introduced by uniting two or more in the command, as *T—— and L——, get up; S—— and T——, run*, or *S——, T—— and W——, dance;* and in the same manner for the third person. And as a conjunction is introduced here, its use will soon be understood, for if, in commanding two, first one and then the other is addressed, with *and* interposed and distinctly spoken and repeated by the learners, they will speedily catch its meaning, and write it in its proper place.

Analysis by Question. When all these have become mentally connected, so that one word draws or suggests the next, then it would be well to begin the process of analysis, so that each sentence may be known as subject and predicate.

Every proposition is a synthesis or the binding together of two different elements, as subject and predicate. This is a mental act. Analysis is the separation of the elements of a sentence by a question addressed to the scholar, as, *Who walks?* The answer will be, *T——*, the subject. But if the question refers to the action, then, *What does T——?* brings the answer *T—— walks.* This analysis makes considerable demands on attention and reflection. The interrogative terms, as *who?*, *what?*, *what does?*, or *who does?*, are applied to the scholars of the class, so that they see what is done by others, and ask those who do, as well as those who do not, till the discriminating force of the interrogative is understood. *Do* being the verb of action, its meaning, as expressive of everything which can be executed, is soon learned. And at this stage we would advise the form *does* rather than *does do,* which is confusing. Similarly, *did* instead of *did do* should be used.

Here also, to give the teacher more freedom, and introduce the conception of past, as well as present time, the question when one has done something might be put, as, *What did L——?* But the difference between present and past must be well exhibited by the action itself about which the question is asked.

2. OBJECTS. Hitherto the exercises have been limited to the scholars, but the field may now be appropriately extended to objects within the range of the scholars' view, in which the action of intransitive verbs is visible, as *The sun shines*, *A bird flies*, *A dog barks*, *The snow falls*, *The rain falls*, *The wind blows*, *The leaves shake*, *The flowers bloom*, *A horse gallops*, *The lambs skip and bleat*, *The kittens play*, etc. To each the interrogatives *Who? What does?* or *What did?* can be applied.

The introduction of the definite and indefinite adjectives in these sentences is better than than their omission, because they are in their usual place, and for the present it will be enough to explain that *a* is one, and *the* refers to something already learned or well known. The opportunity for a fuller illustration will come at a more advanced stage.

As the union of speech and thought in language is the primary object, so that the learner may increasingly feel the superiority of speech to either writing or signs to express his thoughts to others and learn what they say, he ought not to be allowed to supply the place of fitly uttered words by a nod, or look, or sign of any kind, but utter them distinctly and fully.

Common and proper names have been used indiscriminately in the above exercises, but their difference ought to be observed as leading to our first indication of abstract thought. Common names are descriptive of a class. They bring to mind something of the nature or quality of a class of objects, as *stone*, *wood*, etc., but a proper name does not necessarily do so. It is usually distinctive, and suggests nothing more than the person or object to which it is given. Common names include whole classes, and are definite in this respect; but as used of individual members of these classes, they are indefinite and purely mental. Our idea of a *tree* is not that of any one tree, but of all trees, and therefore has not the distinguishing marks of a known tree, but is a dim outline or abstract of all the trees we have seen. It is, therefore, an instance of abstract thought, in which little children freely indulge. Once let a boy see and taste an apple, and hear its name, the next offered to him will be at once named by him, so that the concept or mental image of apples in general has been formed by Nature's own teaching. The deaf, too, are found to have such concepts of objects before they have learned their names, for they make rough drawings of them with pen or pencil. The abstract in thought has its root in our primary conceptions, and it will be seen, as we advance, that it is an essential element of language, and that it is best acquired from the study of the sentence. It is, however, in the opposite direction that clear thinking and mental effort lie in the capacity to distinguish one object from another, so that their differences, as well as resemblances, shall be fully appreciated. But this is an advanced stage, for which more preparation has to be made.

Transitive Verbs.—These, as their name implies, have direct objects, which only complete the action of the verb in respect to its end or purpose, as *Poke the fire.* On the other hand, intransitive verbs have no real or direct, but what is called an indirect, object, which is nothing more than the direction, initial point, instrument, terminus, or resting-place of the action, and therefore the preposition which is used to express this relation shares with the verb in its conception. Sometimes it stands alone in this respect, as *Get up, Sit down.* But as the direct object is the simpler and more concrete in use it ought to be learned before the indirect.

Strike the table, *Open the door;* or, in the third person, *T—— strikes the table*, *L—— opens the door*, are examples of the large number of such verbs available to the teacher for stirring exercises.

This form of the sentence increases the items for analysis. We can now ask, not only, *Who did the act?* but also, *What did he strike?* to elicit the object of the action; and it would be well to employ it to enable the learner to distinguish between the act and its object. A great number of verbs expressive of action, and arranged systematically, will be found at a more advanced stage, but they can be largely introduced into the earlier sentences, and their indefinite past taught by the interrogatives used in their analysis. As these form a great part of the very body of language, a thorough knowledge of them in the present and past will increase the learner's vocabulary.

Indirect objects of intransitive verbs may now find a fitting place in the exercises. As already stated, they usually express something about the direction of the action, and so complete the sense, as, *Go to the door; Come from the fire; T—— sits on a chair; E—— stands on the floor; J——, leap over the stool; F——, sit by C——; Run into the greenhouse; T——, W——, and J—— stand at the door;* etc.

Transitive verbs also take indirect as well as direct objects, and though more extended in form, and requiring more reflection, are simple enough for this stage, as, *T——put the book on the table; J——, lift the pin off the floor; L——, put your hand into mine; L—— laid the poker on the fender; E—— put a book into the drawer; W—— and T——, fetch the chairs; put the chairs by the table;* etc.

Prepositions.—Nearly all the prepositions used in these relations may be clearly illustrated by a ball or small globe of wood and a rod. The former ought to be pierced at different points at various angles, as well as through the centre, with holes large enough for the rod to enter them, and either stopping short at the centre, or passing right through. Then it should be suspended by a cord attached to two hooks, one at each side. Take the rod and hold it *over* or *under*, or move its point *to*, *from*, *into*, *through* the ball, etc., and this will make the meaning and use of the prepositions self-evident. Then apply this knowledge to other objects. This process provides a natural definition by showing the actual use of the words, and can never be surpassed by descriptive terms.

This relation is one of place, in fact adverbial, and to elicit it in the analysis, we ask. *Where?* or *In what place?* Place being abstract, can be taught by pointing to the spots usually occupied by familiar objects, as *Where did E—— put the book? Where did T—— put the chair?*

The subject might now be expanded by an adjective, and the predicate by an adverb, but as they cannot be conveniently taught without the aid of the pronoun, the use of this will be illustrated first.

Personal Pronouns. The pronoun is an abstract part of speech, for it is not the name of any object, but a substitute for the name of every speaker, or person spoken to or of, as well as their plurals. It is, therefore, only a convenient sign common to each and all of these classes. The first person, *I,* is never used by little children. They speak of themselves in the third person, as if the reflection which leads to the conception of self were still inadequate. Till this comes, the conceptions expressed by the second and third persons of *I* are still imperfect, for self-knowledge must always precede our knowledge of others. The intelligent use of the pronoun is therefore an advance in language, and the order of nature has been followed in reserving it till the reflective power is sufficiently developed by exercise on simpler forms of thought to grasp this personal concept. In teaching it care must therefore be taken to make its meaning apparent by the exercise. If a scholar named Tom is told to do something, as, *Open the door,* and when it is done, is asked, *Who opened the door?* he will probably reply, not *I opened the door,* but *Tom* (in the third person) *opened the door.* At this point the substitution of *I* for *Tom* can be made for him, so that he will learn to say *I opened the door.* Better to repeat this by a number of similar acts, till the use of *I* becomes familiar. In the same manner the third person can be taught, for if the question is put to the other members of the class, *Who opened the door?* the reply will be *John,* for which *he* can be substituted. As *you* and not *thou* is commonly used for the second person, better to teach it. Let the teacher himself open the door, and then inquire, *Who opened the door?* The reply will be *Mr. S——opened the door,* and for the name *you* can be given as its substitute. With the other genders and numbers there will be no difficulty.

But the pronoun serves other important uses in addition to preventing the too frequent repetition of the noun : it also distinguishes the genders and numbers of the nouns, so that when it is joined to a verb, it supplies what is generally absent in our language—except in the second and third persons singular of the present, and the second singular of the other tenses—the personal terminations found in Greek and Latin verbs ; and then in composition it serves to repeat the subject, or supply an object in a more convenient form However, these are points of whose importance the scholar can know little at present ; but he can be made to see, by writing out a number of his former exercises, and then substituting the pronouns for the proper names, how much shorter they are, and how they enable him to think of them in a new or abstract form.

The conjugation in the present and past imperfect tenses of the verbs already learned may now be practically taught by actions arranged as a little game : as, I walk, You walk, He walks, She walks, It walks, We walk, You walk, They walk, I walked, etc.

The Culture of Memory. The stage at which we have now arrived is one in which much greater demands will in future be made on the memory of the learner, from the introduction of more abstract forms of language. No progress can be made if they are forgotten, for the principal elements of thought will be lacking. The truth of a proposition often depends on the person or tense of the verb, and therefore the names that express them ought to be familiar. How is this to be secured ? Some teachers answer, go on with the illustrations, till memory distinguishes all these differences with ease. This is not satisfactory, as it involves a great expenditure of time which might be saved by a better method. Experience has shown that the memory of the deaf is usually bad. It has not been exercised, and therefore has not the tenacity that arises from the culture enjoyed by hearing children. Suppose they had heard, then these verbal forms would have been repeated thousands of times in their hearing, till it was hardly possible to forget them. The deaf have nothing of this, and to supply its place, as far as time will permit, we ought to imitate nature, and introduce forms of repetition which will effect the same results. If the rule is strictly adhered to, *Never task memory by repeating mere sounds or unknown propositions, but only what is well understood,* then, however tiring frequent repetition may be, it will not distract it. There is a wholesome method and measure in this as in every other mental exercise. If the repetition is made in the stirring circumstances which first illustrated the sentences, the end will be secured without the apathy which usually accompanies mere committing to memory.

These repetitions in the presence of the teacher will moreover make speech more facile, while they habituate the scholars to its forms. Such verbs as *Have, be, do,* etc., ought to be perfectly learned in the present and imperfect past tenses, so that all mental stumbling may be avoided, and the thought pass freely forward to the new terms of the exercise.

Terms of Analysis. In the analysis of sentences, a few interrogative terms as, *Who? what?* have been explained as they were required; but these do not suffice for all the forms of thought. The following are inserted to assist the teacher :—

1. The Agent or Subject		found by	*Who? Which?*
2. The Object of the Action,		,,	*Whom? What?*
3. The Time	,,	,,	*When?*
4. The Place	,,	,,	*Where?*
5. The Manner	,,	,,	*How?*
6. The Number or Quantity,		,,	*How many? How much?*
7. The Cause or Reason,		,,	*Why? Wherefore?*
8. The Action, which ought to be added,		,,	*What does? Who does?*

In elementary teaching, too close an analysis ought to be avoided. As the subject and predicate are the essential parts, they ought to be sharply distinguished; and for these two terms will often suffice—*Who?* or *What?*

The Verbs Have, Do and To Be. These verbs are very often used, and have to do double service, being at the same time principal and auxiliary. As principal they have their own distinctive meaning, but as auxiliary they are for the most part only signs of certain tenses of other verbs. This double service and meaning make them difficult to teach, for if their principal use is first learned the scholar is likely to associate it with the verb when he learns their auxiliary use, which creates confusion of ideas. To avoid this is difficult. Some have endeavoured to obviate it by first teaching their tense use as auxiliaries and afterwards their use as principals, but as in the latter use they are the small change of language, without which little can be done, it is more necessary to teach their principal use first, and afterwards their auxiliary, guarding the learner, at the same time, against error, by pointing out their purely tense value. These three verbs are abstract, and one of them, *to be*, has several special functions.

Have, as a principal verb, is not a verb of action so much as of state or condition. In one of its uses it simply means holding, as *I have a book in my hand;* but in another it means possessing, as *I have twenty pounds.* In this abstract sense it means property. But it would be out of place to introduce this difference of use at this stage. Its abstract meaning will soon be learned from the strong natural tendency of every child to appropriate whatever he likes.

The present tense of *have* ought to be fully illustrated and well learned, as *I have a hat*, *You have a coat*, *She has a dress*, etc. By the use of its interrogative form, exercises can be multiplied at will, as, *Have you a knife?* and the answer ought to be in full, *Yes, I have a knife*, or *No, I have not a knife.* The idiomatic use of this verb in the place of *to be*, as *Shall we have a fine day?* instead of *Will the day be fine?* ought to be reserved till its principal use has been well learned.

The imperfect past tense *had* ought to be also well learned and illustrated.

Do, as a principal verb, stands in relation to action as *to be* does to existence. It may be called the abstract and general mental concept of all action, voluntary or involuntary, material or spiritual, right or wrong, and therefore its interrogative use, when the kind of action and its result would be learned, as *What does or did he do?* covers the whole field of verbs of action. Its frequent use as an interrogative term is very essential in the education of the deaf, for it compels mental effort in giving the answer which they most require in learning to think. The emphasis ought therefore to rest strongly on *do*, *does* or *did.*

To illustrate its abstract use, let a number of different acts be written, such as

James strikes the table
Charles writes a lesson
Emma sweeps the hearth
Robert writes a letter, etc.

What does......... ?

Then bracket them, and ask the question, *What does James, etc.?* The answers will bring out the sense.

The idiomatic form, *How do you do?* means little more than, *How are you?* whatever it may have meant. If the latter is substituted for the other a few times the learner will find out its meaning.

To Be. (The Abstract Form of the Predicate.) In speaking of the education of the senses, it was stated that the principal object in their culture was to obtain the *attention*, *imitation*, and *observation* necessary for learning speech successfully. That this has been done is evident from our scholars being now able to speak. But this is not the only, or even the highest object of this education of the senses. Then we sought to reach the mind through the senses, in order to rouse it to the more active and efficient use of its own powers of perception and thought. Now, the reverse process is initiated of putting the mind into the full possession and control of the senses as its instruments or servants to be used for its own special purposes, as their master and not their slave, in full command of them and all they can contribute to the formation of correct conceptions, fair judgments, and right decisions according to natural laws.

Verbs of action are most useful in the elementary study of language, for they appeal to the senses, and the ideas formed through them resemble pictures, which have only to be translated into speech. The propositions thus framed simply certify or report the facts as perceived. When we say, *S—— walks, The sun shines*, we only report what we perceive without comparison or criticism. A language consisting only of such affirmations would be little better than that of an animal could it speak. Mental development depends chiefly on a class of verbs not expressing motion or action, unless it be mental, but the identity of the subject and predicate in some respect, as *Twice two are four.* In sentences descriptive of action the verb is the predicate, and whatever is added is only its complement; but in this form of proposition or sentence the predicate is a noun, adjective, or some equivalent word, and the verb only the band or *copula* which expresses the identity, mentally affirmed, as *God is good.* This is not an attributive relation, but a purely mental affirmation arising from the comparison of two objects, and the assertion of their identity or the contrary. The senses no doubt supply the matters on which these judgments are formed, but no picture can be made of the mental acts themselves. The copula is abstract and only a literal sign of what cannot be translated pictorially.

To be means *to stand, to be fixed*, and hence *to exist.* Very probably its abstract meaning as expressing existence or being, as opposed to nonentity, was derived from this primary use. Its other meanings, such as *becoming, remaining*, and *being present in a place*, are derived from that of *standing. I was in London yesterday*, is, *I was present there.*

Its simplest use is seen in affirming the identity in fact of two nouns, as *T—— is a boy, E—— is a girl,* *I am a man*, *Mamma is a woman;* or identity in quality of noun and adjective, as, *I am old*, *You are young*, *W—— is little*, *F—— is big*, *The tree is high*, etc. If, in teaching, the attention of the learner is specially directed to this conception of a common property or resemblance, as *T—— and L—— are little*, or in such examples as *One and one are two*, *Three and two are five*, the use of this verb will gradually be perceived.

Most of the deaf readily perceive close resemblance or similarity in two objects, and would express this in signs by placing the index fingers side by side. This is the natural or material ground of the conception, and through it the thought can be led on to the abstract copula.

In the above examples the identity of one noun with another is first given, because simpler. The senses lend their aid; in fact, it is the affirmation of something self-evident. But when an adjective is the predicate, then reflection has to assist the learner, as in *Tom is little*. To verify it a comparison has to be made, and memory must provide the variations in height which led to its use. This exercise is therefore more abstract and complex.

Tenses of the Verb.—Although time is inseparable from either movement or thought, it is an abstraction destitute of substantial existence. It is a metaphysical distinction, necessary to a right conception of the nature of tense, for it means present, past, or future, the moment of the action thought of, as distinct from the moment in which we are speaking. These are the three great distinctions of time, but they do not suffice for all the movements to which action or thought refer. Hence the past is divided into three tenses. The first, to express the completion of an action then and there, as, *I have written my letter;* this is called the perfect past, or present perfect. The second, as having taken place at some past point of time, as *I wrote my letter;* but as this is incomplete an adverb or adverbial phrase is usually added to make it more definite, *I wrote my letter yesterday; He came at one o'clock.* The interrogative, *when?* shows the relation of the adverb to the verb in the answer, as marking the time more exactly. This is the imperfect past. The third, when two past events have occurred in close relation, one prior to the other, and the second is referred to because it aids in giving a more exact conception of the moment of time of the first, as *I had written my letter before the post-boy came.* It will be observed that the dependent sentence is in the imperfect past, while the principal sentence is called the pluperfect past. The future has two tenses. The first future, which refers the event to an indefinite moment in the future, as *We shall see him,* to which an adverb or adverbial phrase is added when the moment of time wants a more definite statement, as, *We shall see him to-morrow, or at twelve o'clock.* The second future resembles the pluperfect in being used of two events, the second more exactly fixing the moment of time of the first, as *The moon will have risen before we set out.* It will be observed that the adverbial sentence follows the principal, and that the present tense is used instead of the first future. Sometimes an adverbial phrase takes the place of the adverbial sentence, as *We shall have done at one o'clock.* We are, therefore, affluent in tenses, and can describe the points of time very clearly. This renders our work as teachers more difficult, but our resources are equal to the occasion. The idea that at one time prevailed among teachers of the deaf, that only the three principal tenses could be taught, had its birth in defective methods, and a want of a clear perception of the relations of action to time. Had it been observed by them that the complex sentence requires all the tenses, they would not have concluded so hastily that the deaf were unable to advance beyond the principal tenses. Oral teaching has the advantage of the sign method in this respect, for we have only to persevere in the logical development of the sentence up to its complex forms, to find out that they can understand the uses of the secondary as well as the principal tenses.

Measuring Time. Time and Number are closely related, for time is measured by intervals of seconds, minutes, hours, days, etc. Little children learn to count before they take much note of time. The intervals of night and day, of eating, sleeping, and playing, are among their first conceptions of time as present, past, and future. But it is long before they can make out what is meant by a minute or an hour. These require a power of reflection and of noting the progress of events measured by a known standard, to which they have not as yet attained. But the necessities of life are their best teachers, as when a child is anticipating some great pleasure, he begins to count the hours which intervene.

The deaf are much less advanced, and their notions of time are very indefinite. Yet they too discover its relations in the events of daily life, and perhaps attain to the Indian's idea of the present being over, the past behind, and the future before him. Learning to count prepares the way, but spoken language will better help the scholar to learn the hours of the day, the days of the week, and the months of the year. Better, however, to begin with the first, if there is a clock at hand with a seconds pendulum. Pointing to its beats, let him count them, and if he can go on to sixty show him that sixty of them make up a revolution of the seconds hand. This is the best measure of time for him, for he can now advance to the hour by counting sixty of these revolutions, and as twenty-four hours fill up the day, he gets a tolerably intelligent conception of how time passes. Yesterday and to-morrow now become more definite, for his conception of the length of the passing day enables him to measure it in the same manner for the past or future. These definite ideas about time will be the scholar's best preparation for the tenses of the verb. The present, past, and future tenses ought to be taught in connection with these lessons on the progress of time. The adverbs *now, not yet*, *to-day*, *this morning*, *this evening*, *yesterday*, *to-morrow*, ought to be illustrated by asking questions on the events of to-day, etc.

Let all this be so well done that any question on the divisions of time is readily answered.

The four tenses of the verb, present, perfect, imperfect, and future will enable the teacher to extend and vary the exercises on the simple sentence used to express the events, pursuits, and ends of life and action. But the use of each tense should be taught independently before they are employed in their different uses as free conversation may require.

Order of the Tenses. Here, if anywhere, the simple must prepare for the complex. To attempt to teach the tenses in their grammatical order would be worse than useless. Their right places are determined by the time in which they are thought, not only as present, past, and future, but in relation to other events, or as parts of complex sentences. As at present the simple sentence alone occupies us, we have only to consider the tenses it requires.

A practical difficulty is in our way in respect to the past. We have two tenses, the perfect past tense, as *I have written,* and the imperfect past, as *I wrote,* to express the past of an action. Which shall it be, the perfect or imperfect? Tarra says that "at first the near past should be preferred to the remote, for in fact, though compound, it is easier, its conjugation less varied, less irregular, and it lends itself better to the primary exercises on the past—exercises which are always related to the action already completed." But our tenses do not quite correspond with those of other languages, and there is something special to them which determines their place. *I have written my letter* is complete in relation to time and object, but *I wrote my letter,* incomplete in relation to time, and may raise the question, *When did you write your letter?* The perfect would, therefore, seem to be the simpler. But on the other hand it very much limits the room for exercises, and as the imperfect has been already learned in the analysis of sentences, and the adverb in completing the predicate, both tenses may be freely employed, only the exact use of the perfect ought to be first taught by a number of acts, terminated immediately before, and witnessed by the scholars. *Have you written your copy?*

I have come from town. We have seen the flowers in the greenhouse. The sun has set, etc. The interrogative ought to be in the perfect form also, to elicit the right answer.

Then follow with the imperfect past. Such sentences as *When did you see papa? I saw papa at Christmas*, ought to be multiplied in conversation.

Auxiliary Verbs. The use of *have* in the perfect tense introduces an auxiliary verb, in fact a second verb involving an apparent complexity which is likely to confuse the learner. Accustomed to this form from childhood, we hardly take account of its peculiarities and differences from the other tenses. Here two words do the service which one might have done as well if not better. If auxiliary verbs were exclusively used as such, and merely as signs of time, they would be less perplexing, but they are at the same time principal verbs, each having its own specific meaning and use. Some of them have to part with this, as *have, shall, to be, do,* and *let,* and become a tense sign, while others retain their meaning as principal verbs, as *can, may, will, must, ought,* and lend it to the verb of the proposition. Care must, therefore, be taken in teaching to make this difference clear, and save the learner from attempting to combine *have,* in the sense of holding, with the verbs to which it is united as an auxiliary.

Have is used with all the perfect tenses, past and future, active and passive, and in the potential and subjunctive moods, either in its present or past form *have* and *had.* In addition to these it is used in the infinitive perfect, active and passive.

To be is specially appropriated by the passive voice in all its moods and tenses. It has hence become almost a sign of the passive, but the learner must be led to distinguish this from the active by the perfect participle, with which it is united. But there is also an active use of *to be* when the present participle in *-ing* is used to express progressive or continued action

Let is used in the imperative.

Do finds its place in the present and imperfect indicative and subjunctive, in adding emphasis to the verb.

Shall and *will* are the auxiliaries of the future. The first is an auxiliary tense, but the second retains its principal meaning and implies volition. In their past tenses, *should* and *would,* they are found in the potential mood, with their own meaning, as, *I should know you, He would not see me.* In addition to these, *will* in the 1st person, *shall* in the 2nd and 3rd persons, have an imperative force.

May and *can* are appropriated by the potential mood, each retaining its meaning as a principal verb.

Must and *ought* are peculiar in expressing necessity and duty.

As yet the present tense of the verb only, in its most indefinite form, has found a place in the development of the sentence, but our language is richer than most in providing other forms, one in respect to time and another to the emphatic force of the affirmation. To say *I write,* may or may not refer to any but the present moment. The action may extend over a long period of time, as *I play at ball, I spend the winter in France.* But if I say *I am writing,* the action is affirmed to be passing forward at the time when it is spoken of. But its chief value lies in describing the continuity of the action from the past into the future, which it is often necessary to express precisely.

Again, when an action is doubted, questioned, or requires emphatic expression, *do* is employed, as *I do write my lesson. He does speak the truth. Do not come here. He does love his parents.* These forms have also a past imperfect tense, as *was writing, did love.*

The verb *to be* does not admit of these forms, as it does not express action. A number of appropriate examples of these uses ought to be introduced, and their difference of meaning shown by action, as, *I write on a slate and in my exercise book. I am writing my lesson. Do you learn your lesson? I fear you are idle. Yes, I do learn my lesson.*

Sentences should be taught *viva-voce* in the form of questions and answers framed as a conversational exercise. These exercises ought to be made lively by the introduction of stirring action and the use of incidents which have excited attention.

Every verb employed in them ought to be written out on the blackboard in the four tenses, as *write*, *have written*, *wrote,* and *shall write,* and all the persons of both numbers repeated in the usual order, as, *I write, you write* (not thou, for it is rarely used), *he writes*, *she writes,* etc. When a verb has been taught and learned in this manner, then the scholars should be encouraged to compose sentences on its different tenses and their persons. One will probably begin with the sentence *I write on the black-board,* and the teacher may take occasion to ask, *With what did you write?* He will reply, *I wrote on the black-board with a piece of chalk;* and this prepares the way for some very useful exercises on nouns, etc., in the objective case. If the exercises on these tenses are continued as suggested, the teacher will soon find his scholars begin to distinguish the principal points of time in any action and to reflect much more on the events of their lives. The time of the predicate has taken its proper place in the pupil's mind, and this is a great advance in its development.

The Instrumental Means. The instrument or agent employed in an action can be illustrated in this manner. Procure a piece of board, a hammer, and some nails. Take one of the nails, and holding it in the left hand, with the hammer in the right, begin to drive it into the board, saying, *I drive the nail into the board with the hammer,* making the adverbial complement emphatic by look and gesture. Then ask, *With what do I drive the nail into the wood?* The answer will be *With the hammer.* Again, take a key in your hand and lock the door, showing that it is locked. Then ask, *With what did I lock the door?* The answer will be *With the key.* The pens, pencils, and whatever else is used in this instrumental manner will also furnish abundant exercises for the class in a *viva voce* conversational form.

Such illustrations furnish a very suitable occasion to exercise the scholars in tracing effects to their causes.

Let the teacher direct their attention to the hammer and the nail, and ask, *What drives the nail into the wood?* The answer will very probably be, *The hammer.* This is the proximate, but not the primary cause. Now let him ask, *What moves the hammer?* The answer will be, *Your hand and arm. Yes, but what moves my hand and arm?* Probably this will lead to some thought, and some sharper lad will say, as he points to the head, *Your thought.* Here it ends, as this is the primary cause. Words as yet not learned are required to complete the expression, but the elements are there.

The material of which anything is made or composed is usually expressed by the preposition *of* before the noun, as *A sheet of paper, A fire of coal. What is the table made of? Of wood.* But we also say, *A deal table, A coal fire.* The interrogative with the preposition *of* is that generally used when the material is in question, as, *Of what is this chair? Of oak.*

Adjectives. The adjective and adverb can now be freely taught, for the nouns and verbs have been learned which can be best illustrated by them, and provide for the analysis of the sentences in which they are used. Objects are known only by their qualities. *Form*, *size*, *colour, weight, density*, *smell*, *taste, consistency,* and *temperature* are the principal, and rapid progress is made when these qualities are learned from the objects themselves. Those in most striking contrast ought to be taught first, as *white, black, big, little, round, square, old, young, strong, weak,* etc. Coloured objects are most attractive, and ought to be utilised in teaching not only the adjectives but their names.

Numbers. Whether very young deaf scholars know anything of abstract numbers is difficult to say. Most of them reckon on their fingers, and use them as signs in thinking. But this ought not to be long permitted, for it is not only opposed to the principle of the oral method, but is a lame substitute for a rapid mental act, chiefly the work of memory. Probably we all began our arithmetic by making strokes on the slate, or counting beads, so that we were satisfied of the accuracy of the result from the process; but when memory said twice two are four, we dropped this process and adopted a remembered result. Numbers thus treated are purely abstract. Hence mental effort is saved, and the process of counting facilitated. We ought, therefore, to get our scholars as early as possible to recite the addition or multiplication table audibly. Language will gain by this as it tends to make speech a matter of memory, and much of what we say is nothing more.

Fetch five books. Put them on the table. How many books did you fetch? Where did you put them? What did you do? Count the books on the table. How many books are on the table? How many feet has a dog? Have you four feet? How many fingers have you? How much money have you? By interrogating the scholar in this manner the numeral adjective is taught.

Or else, take some picture, with, say, a number of girls in it. *How many girls do you see? Five. What are they doing? One sits on a block, two run, and two fall down. How many feet have five girls? Two and two are four, and two are six, and two are eight, and two are ten; or five times two are ten. What did you see? I saw five girls; one sat on a block, two ran, and two fell down.*

Qualities of Objects. If the abstract terms which are used to express the inherent attributes of every object—as *shape*, *size*, *colour*, and *weight*—are now taught, they will assist the learner in this form of thought; for we ought to proceed from the concrete to the abstract.

Colour is the simplest. *Red is a colour*, *Blue is a colour*, *Green is a colour*, *Orange is a colour;* and thus for all the colours. These sentences should be spoken with the objects thus coloured near, and pointed to; the emphasis being laid on *colour*, and then repeated by the scholar. The abstract relation of colour to each object will become apparent and perceived. As a proof of this, if the scholar is asked, *What is red?* the answer will be, *A colour.* Or again, *What colour is this?* the reply will be, *Red.*

Shape, or *Form*, affords a good opportunity of dealing with natural and artificial solids. *Round is a shape*, *Square is a shape, Straight is a shape, Crooked is a shape*, etc. Then, *What shape is a ball? What shape is a table? What shape is a window?* In the same manner, size and weight can be taught. Then a question can be asked which includes them all: as, *What size, form, colour, and weight is a shilling? It is little, round, white, and heavy.*

The demonstrative adjectives, *this, that, these, those*, assist in some of these sentences; and they ought to be taught by referring to objects at hand: as, *This book is small*, for the nearer; *That book is large,* for the more distant, or, *These books are new*, for the nearer, disposing them so; and *Those books are old*, for the more distant. Then let appropriate commands impress the meaning: *Put this book on the floor, Put that book in the drawer;* without pointing or otherwise directing the attention of the learner to them, so that he may be guided solely by speech.

As the demonstration of the qualities of objects depends on the "object lesson," we may here quote Sully's definition of it. "The object-lesson aims directly and primarily at exercising a child in full and accurate observation by way of the several senses and in the synthesising of such detailed observations into a clear and adequate total observation. Hence it falls naturally into two parts: (1) the detailed exposition and naming of the several parts, qualities, and relations of the object; and (2) the summing up of the results in a verbal description of the object." Of course, with the deaf the object lesson will be made more or less subservient to the acquisition of language.

Objective Case of Pronouns. Pronouns have hitherto been learned only in their nominative case, but they are also used in the objective and possessive cases as substitutes for nouns; and in the increasing development of the sentence, they are required for its complete expression. In the objective case, they are easily taught by commands: as, *Give T—— a book, Give him a penny, Give me a slate, Fetch J—— a pencil, Give her a pen, Put this book on the shelf, Give it to T——*, and similarly in the plural. This exercise ought to be repeated and imitated by the scholars, to familiarize them with the form, and its place in the sentence.

Possessive Case of Nouns and Pronouns. As the possessive case has its own termination, it ought to be taught independently. Its relation to the noun is expressive of property, and is that of an adjective: as, *This is John's book;* and the more abstract and emphatic form, *This book is John's; Whose book is this? John's.* The writing materials of the members of the class can be used in a lively exercise to learn this case; and some examples ought to be written, to familiarize them with the termination. The corresponding possessive pronouns, as substitutes for the noun in the possessive case, naturally follow: as, *Where is my hat? Where is T——'s coat? Where is his cap? Put our slates in their places. Fetch me William's, Robert's, and George's copy-books. Fetch me their ink-bottles. Open your mouth. Shut your eyes. Clap your hands. Fetch her boots.*

Like the noun in the possessive used as the predicate, so the pronoun is used absolutely: as, *This book is mine, That slate is yours.* The difference in the ending of this class of pronouns to serve as the predicate ought to be noted, and a number of sentences transposed quickly and frequently, to make the respective forms familiar.

Adverbs.—The adverb expresses the relation of the action or state of the predicate, in *time, place, manner,* etc. An action takes place at some one time, in some one place, and in some one form; but as the verb cannot express all these relations by itself with the necessary precision, other words are found to serve the purpose, and complete the action. In many adverbial relations, a single word supplies all that is wanted: as *here, there, now, then, well, yonder;* but these are abbreviated phrases. *Here,* in this place. *There,* in that place. *Now,* at this time. *Then,* at that time. *Well,* in a good manner. *Yonder,* in yon place. *The sun is there. The fire is here. It is now ten o'clock. When he is here, then you shall see him. The river runs yonder.* Usually the adverb ends in *ly*: as, *quickly,* *slowly, wisely, foolishly*, etc., as, *Come quickly*, *Walk slowly*, *He writes badly.*

The relation of the adverb to the predicate is similar to that of the adjective to the subject. Their difference lies in the one expressing a quality or attribute, and the other a manner or form of action or state, and the pointing out of this in action will help the learner to distinguish them. In the more advanced lessons it will be seen that phrases often fill the places of adverbs, as *I put this book on the table* for *I put this book there.* The verbs already learned should now have adverbs united with them, and their subjects with adjectives, as *The cold wind blows strongly, The hot fire burns brightly, That old man walks lamely.*

Tell, Let. These two verbs are so often required, and so necessary to free progress, that it is advisable to anticipate their introduction.

Tell, or *bid him to come,* has the infinitive mood as the indirect object of the predicate, and three persons are acting in every such command, the person giving the order ; the person addressed ; and the person to whom it is to be delivered. This requires some reflection, and the scholar will probably fail in one or other point at first. More ought to be expected of him in delivering his message than to say, *Come to Mr.* ——. Such an exercise aids much in developing the power of reflection.

Let. This verb also involves complex relations in its use, for it, too, requires a third person to execute the command. In *Let him come,* the second person is addressed, who is to move the third to do what is required. Its presence in the imperative requires its frequent use, and therefore it ought to be known. As a principal verb it has the sense of *permit* or *suffer,* but it is generally used in an auxiliary relation as its sense requires another verb for its completion.

The Infinitive Mood.—Objects and their attributes have hitherto supplied both the direct and indirect objects of transitive and intransitive verbs, but they are not always appropriate, and another verb or another sentence may fill the same place. The complex sentence is composed of two sentences in this relation, for one action may be the cause or occasion of another, or one affirmation require the addition of another to complete its meaning. But one of the resources of language is not to state the second sentence in a complete proposition, but to use the infinitive mood as a substitute, as *Tell him to come*, for *Tell him that he must come.* This is the form generally adopted where the action only requires to be directly expressed; and it might be said that the infinitive, as the object of an action, takes the place of the dependent member of a complex sentence. The exercises for the present should, however, be confined to the infinitive alone. When the complex sentence is taught it may then be more fully illustrated. If sentences, in which nouns are objects, alternate with those in which infinitives take their place, the learner will better comprehend their relations to the principal verb: as, *He learns arithmetic; He learns to write; We like to play. What does he learn?* etc.

But the infinitive mood may also be the subject of a proposition, as, *To write well is praiseworthy; To eat too much is bad; To live soberly is our duty; To help the poor is a great pleasure.* This is, however, a use of the infinitive which may be deferred.

Sometimes the present participle takes the place of the infinitive as subject or object of a proposition, as *He learns reading and writing, Reading and writing are taught at school.*

The perfect infinitive is also used as the subject or object of the predicate, as *He is said to have spoken well.* Here it is the object, while in *To have followed the plough is no disgrace*, it is the subject. These, however, belong to a later period of study.

Comparison of Adjectives. Adjectives, as the names of qualities, are fruitful subjects of thought, for they lead to comparison, classification, and abstraction. Of substance, as such, we know nothing. It is an abstraction, a name for that in which the qualities we perceive are united, or the *substance, i.e.*, that which stands under them. It is, therefore, by their qualities that we distinguish, compare, and classify the objects about us. But to do this we must put things together, and closely observe in what points they agree or differ. This is comparison, and little children can do it, and no better exercise can be provided for them. They must think, if they compare ; and if they think about the qualities of things, and learn to speak about them, they are led to separate in thought the quality from the substance, and this is an abstract of the first degree.

Questions as to the objects the learner has under his eye, their number, kinds, appearances, form, outline, colours, and size, direct his attention to the examination of the qualities of things seen by him. Their kinds can only be learned by their resemblances and differences ; and their appearances, forms, and outlines by comparison and reference to other things the names of which have been already learned. The interest which children feel in the colours, the forms, and the odours of flowers and fruits is intense. The deaf will learn to arrange the colours of a pattern, construct buildings, and distinguish mathematical solids before they can utter a word ; and most of them, by the training of their senses, are in possession of a large stock of concepts to which names have only to be given. These names ought to be taught as elements of sentences: as, *Give me a white ball.* Something has already been done in this direction, but more is required, and the interrogative *Which?* may now be used : as, *Robert, I give you a red rose ; Emma, I give you a white rose.* Then ask, *Which rose did I give Robert? The red. Did I give Emma the red rose? No, you gave Emma the white rose. Where is my red cap? Your red cap hangs in the hall.*

In comparing two or more things there are a few general conceptions under which they can be all classed, for they are *like* or *unlike*, the *same* or *different*. All comparisons imply these distinctions. They are abstract, but capable of the fullest illustration. They find a place also among the earliest conceptions of children.

But to prepare the way for exercises in the comparison of adjectives it is very desirable that the meaning of these terms should be well taught by numerous examples.

Same and *different*.—These can be well illustrated by the numbers, colours, and weights of balls. Let two of each, which exactly correspond, be laid side by side, and their sameness be pointed out. Then let the word *same* name this agreement. Again, let two of each which differ be placed side by side, and their difference from one another similarly made evident.

Like and *unlike*.—These are often used for *same* and *different*, but not correctly, for *like* merely suggests an idea of resemblance, and is therefore less definite than *same*. We say these two brothers are very like one another, but not they are the same. *Like* therefore admits minor differences, which are excluded by *same*. This ought to be attended to in illustrating them.

Degrees of Comparison.— By suitable practical exercises on concrete objects, of which such questions as *Which is the longer*, *longest*, *taller*, *tallest*, *harder*, *hardest*, etc., are asked, the comparative *er* can be distinguished from the positive, and the superlative *est* from both. The exercises in this form ought to be numerous enough to make the scholars not only familiar with these terminations, but also quick in comparing. In the same manner there ought to be suitable exercises in comparison which require *more* and *most*, *less* and *least*, instead of *-er* and *-est*.

Fetch two roses from the greenhouse. Look at them. Tell me which is the more beautiful? Which is the less beautiful? Smell them Which is the sweeter? This red one. Which is the less sweet? That white rose.

After these, a few of the irregular comparisons—as *good, better*, *best; bad, worse*, *worst; little*, *less*, *least; much or many, more*, *most*—ought not only to be well illustrated, but learned off till they can be repeated with facility. The regular comparisons are less difficult to remember.

Than.—The above forms of comparison are incomplete, and only introductory to those commonly used. But *than* requires a complex sentence, which may seem too difficult at this stage of the learner's progress. This is, however, less real than apparent, for in practice it is found that he can learn it without any special mental effort, for the sentence seems simple, though really complex. The conjunction *than* is the pivot word of this relation of two compared objects. As a term, it is purely comparative and indifferent to degrees: as, *J—— is taller than T——. This chair is larger than that.* The inversion of the sentence does not affect its meaning: as, *That chair is smaller than this.* It would, therefore, be well to return to the previous exercises, and express them in this manner, not forgetting to transpose each of them as shown, on account of the greater exercise they afford to reflection.

In the superlative, *but* must be introduced, and this belongs to the compound sentence. Its ease in use is, however, a sufficient reason for its introduction, and illustrates one of its several meanings. Here it is not so much adversative as comparative, for it fills the same place between the comparative and superlative, as that filled by *than* between the positive and the comparative.

Place three books together, differing in size or colour. Compare the two smaller first and then all three: as, *The red book is larger than the blue, but the brown book is the largest.* The exercises on comparison can now be repeated in the superlative also. Much more of mental effort is required in these comparisons than appears at first sight, for they involve the use of abstract forms, which have to be mentally treated as if they had material existence; and therefore a large familiarity with them greatly increases the power of reflection.

Classification.—If the teacher requires the scholars to collect and arrange adjectives under the heads of form, size, colour, weight, etc., and then to apply them to appropriate objects, their conceptions of them will become clearer.

The Concrete and the Abstract.—Adjectives are the names of qualities, and when we wish to describe any object, as an apple, we do it by reciting its qualities: as, *An apple is a round, smooth, red, hard, light, sweet, and nutritious fruit.* All these names are used in the concrete, because they are associated with the object. But suppose we want to think of one of them specially —as, *This apple is red*—we make a predicate of the quality *red*, and so far abstract it or take it away from its object. This is called abstraction in the first degree. But again: suppose we wish to think of one of these qualities alone, without reference to the apple or any other object, then we have to add to it a termination, *ness*, which expresses this mental process: as, *redness, sweetness. We love him for his goodness. The brightness of the sun dazzles my eyes.* But not always, for we say, *I like green better than blue.*

But adjectives alone are not abstract. Every common noun is an abstraction: as *tree*, *man*; for our concepts are made up of abstracted features. There is no one tree corresponding with our concept of a tree, and no one man with our concept of a man. The difference is evident in such a sentence as this: *Edward is a boy. Edward* is concrete, and the predicate *boy* an abstract of the class to which he belongs. Again: there are many verbs which are abstract: as, *do*, *have*, *live*, *die*, etc.; because they no longer describe one act, or relation of one object, but whole classes of similar acts and relations. The verb *to be* is abstract as affirming the relation of similarity or identity between subject and predicate.

It has often been said that the deaf cannot attain to abstract thought, but that all their thinking is concrete. Were they taught by signs only, this would be apparently true, but not really so, as has been seen; but if they are taught orally, it is not correct, for language itself is so constructed that to learn it in the order of its logical development is to think abstractedly from a common noun on to an abstract quality. Did those who speak their native language correctly never learn a rule of grammar or a page of logic, they would still use the abstract as well as the concrete.

The abstract has its root in the concrete, and if we would lead forward our scholars, we have only to proceed from the one to the other to teach them to abstract like ourselves. *Fetch two flowers, a red and a blue. Which do you like better?* One replies, *I like the red better*, another, *But I like the blue better. Do you like red more than blue? Yes, but I like green best.* This is abstraction, and the more fully the scholar is exercised to think in this manner the greater will be his progress. These are really complex sentences, but as they are an easy introduction to the use of the conjunction *than*, it is better to teach them.

The relations of the concrete and abstract in adjectives and nouns may be shown syllogistically, thus :—

$$\left.\begin{array}{l}\text{A (black) man}\\ \text{A (black) woman}\\ \text{A (black) child}\\ \text{A (black) dog}\\ \text{A (black) cat}\end{array}\right\}\text{ is an animal.}$$

$$\begin{array}{c}\text{An}\\ \text{animal}\\ \text{is}\end{array}\left\{\begin{array}{l}\text{A black (man)}\\ \text{A black (woman)}\\ \text{A black (child)}\\ \text{A black (dog)}\\ \text{A black (cat)}\end{array}\right.\quad\text{hence}\left\{\begin{array}{l}\text{The man is black.}\\ \text{The woman is black.}\\ \text{The child is black.}\\ \text{The dog is black.}\\ \text{The cat is black.}\end{array}\right.$$

In this case the attribute of *blackness* is affirmed to be common to all and at the same time abstract.

Abstract Ideas and Moral Qualities. A still wider field, and requiring maturer mental energy than is necessary to apprehend the qualities and properties of the material lies open to the teacher in our mental and moral attributes. These are more purely abstract because the qualities themselves are mental or emotional. To think, to perceive, to remember, to know, to forget, to learn, are all abstracts, as are thought, perception, memory, knowledge, forgetfulness, learning. But they can be taught by resorting first to their active form, as, *Tom forgot his lesson last night. He is forgetful. Forgetfulness is a fault. You saw a poor man* *yesterday. He was very miserable. His clothes were ragged, and he had no food. Many people do not think of the miseries of the poor. Poverty is not a disgrace. Did you remember your lesson? No, I forgot it. Your memory is not good, you are forgetful.*

In the same manner the emotions can be taught by analogy, as anger, joy, etc. *Tom was angry, and struck William. Anger is bad, it leads to sin.* As all abstracts are from concretes, the rule to proceed from the concrete to the abstract in explaining them is the best in practice.

In common with others, the deaf have a moral nature, and as soon as they can use signs, or are able to think and speak a little about common things, they give expression to their sense of the difference between right and wrong. There is now a fitting opportunity for doing something efficiently in this direction. Our best method is to point out the moral qualities of the good or evil incidents of school life, and then to supply the abstract noun as the moral of the lesson. The teacher can construct his own lessons on these lines, for nothing is equal to the actual for moral instruction. The Bible furnishes many moral stories which might be recounted in simple words. When the scholars are a little more advanced this is a subject which can be reverted to with profit both morally and mentally. It would be well to write out a selection of the adjectives and abstract nouns used to express moral qualities, and as opportunity offers to illustrate them carefully.

Comparison of Adverbs. As actions and qualities are modified by adverbs, as nouns are by adjectives, they are also compared in the same manner, according to their degree, as, *A rook flies swiftly, but a pigeon more swiftly.* Let three boys walk, one slowly, another more slowly, and the third still more slowly. Now you can say, *William walks slowly, Edward more slowly, Robert most slowly.* From their former exercises on the comparison of adjectives, that of adverbs will be soon learned, only the difference between the adverb, as expressing the manner of the action, and the adjective the quality of the noun ought to be carefully attended to, else they will be confounded.

The predicates of most simple sentences are formed by verbs of motion, and to define that motion more accurately as to time, place, order, manner, degree, or cause, there is an abundance of adverbs not only to express these modifications, but to introduce comparison, as, *Tom plays ball well, Robert better, but William best; Mr. M —— has much money, Mr. B —— more, but the Queen has the most.* The irregular comparisons ought to be well illustrated, as they are frequently used, and when learned the analogy of the regular comparison assists the learner.

Many adverbs are formed from adjectives, as *wise, wisely*, and these are compared by *more* and *most.* Some adverbs of time, place, cause, etc., are incapable of comparison, because they are used of specific or distinct modifications, as *I hope to be here when he comes. Here* means in this place, *when* at the time, and do not admit of comparison.

The Potential Mood. Three of the moods of the verb have been already employed in the development of the simple sentence; two more remain, the potential and subjunctive. Of the subjunctive nothing need be said at this stage. It will be illustrated in the complex sentence to which it belongs, and the infinitive as the subject or object of a sentence has already been dealt with.

The potential mood presents considerable difficulties to the learner, because the verb itself fails to express the requisite modification, which has to be supplied by auxiliary verbs, expressing not tense only, but also difference of signification. In fact they are verbs pressed into this special service, and if their own meaning is well known, their auxiliary use will be more quickly learned.

These auxiliaries are, *may, can* (past *might, could*), *should, would, must*, and *ought.*

May means possible, able, permissible. Radically, it is the same as *can*, but is now used to imply some other will, reason, or law, influencing the action, whereas *can* refers to what is more in the power of the actor. When the question is asked, *May I go home?* the will of another is appealed to, so that the power rests with him to grant or refuse the request. *Yes, you may go* implies that permission has been given But sometimes the reference is to some rule, principle, or reason, which the speaker feels bound to obey, as *I may not play now, for I have to learn my lesson. We may not stay longer; it is time to return.*

Can at first meant to know, but has come to express the possession of power, mental, moral or physical, rather than of knowledge. This power is possessed by the agent, which he uses if he wills. *I can write* implies the ability to write when I please. It might be taught by such exercises as these: *Robert, can you lift that table? Try. I can lift it. William, can you leap over the house? No, I cannot; but I can leap over a chair. Can you read? Yes, I can read a little. Can we have a walk to-day? No, you cannot; it rains Can you lend me five shillings? No, I cannot; I have only one shilling.*

The past tenses of *may* and *can* are used in the complex sentence, and are therefore reserved.

Must means obliged, constrained, or compelled—physically or mentally—to do or be anything, as *You must not play in school. You must not strike your brother. I must punish you; you are a bad boy. May we steal? No, we must not steal; it is wrong.*

Ought expresses the abstract conception of moral obligation or duty—what we owe and should pay to God and man, as *We ought to obey the commandments of God. The will of God ought to be obeyed by all men. We ought to love our neighbour.*

To lead the scholars to the clear comprehension of this verb requires a considerable knowledge of language, and it would therefore be better to delay its full illustration than to risk an imperfect conception. *Should* and *would* are reserved for a later stage.

The Articles or Distinguishing Adjectives. In speaking of one or more things, the individuality of which we seek to distinguish, certain words are employed, called by some indefinite and distributive pronouns ; by others distinguishing adjectives. The fact is they fill the functions of both. Their value lies chiefly in their distinguishing character. They direct the attention to the objects which are to be most attentively considered at the moment, and thus avoid the confusion arising from having other objects as well before the mind. Of these *a* and *the*, formerly called the indefinite and definite articles, stand first.

The indefinite *a* is another form of *one*, and indicates that we are thinking of only one of a class. If I say *Give me a book*, while one book only is asked for, it is left to the finder to take any book and give it to me. But when, a second time, I ask for the same book, I say *Give me*—not *a*, but—*the book*, for this is the one I want, and no other. Therefore *the* is definite, not only as to number, but also as to kind. We are in the habit of using this definite adjective of persons and things well known—as, *the queen*, *the prime minister*, *the sun*, *the moon*, etc.—because the person or thing is at once suggested. It is also used when there is no danger of being misunderstood, as *Go to the door*, when there is only one door in the apartment ; but when there are two it fails, and we employ *this* or *that*. *A* is appropriate when we would speak of any one of a whole class : *A child soon learns to speak ; A wise man prepares for the evil day*. *The*, as used in the predicate here, implies that an evil day comes to every man, hence its definite form.

The use of *an* before the vowels should early have the attention of the teacher.

Indefinite and Definite Pronouns. Objects often present themselves in the relation of groups and parts or individual units of groups. This is a numerical relation, and belongs to everything which can be counted or measured, and to express it conveniently we have a number of words which we call adjectives, but they are also pronouns. They are, *all*, *each*, *every*, *many*, *any*, *few*, *some*, *both*, *several*, *another*, *other*, *none*.

All is used when we would speak of a whole group without special reference to the units of which it is composed, as *All the trees of the wood are now green. The stars are all shining to-night. All is well that ends well.* But in strong contrast to this, and definitely expressing the units of a group, we use *each*, as *Each tree has leaves*, and *Each star is a sun. How many boys are in the class? Give each of them a pencil;* and when this is done, and we wish to know whether the act has been completed, we ask, *Have all pencils?* Hence *all* is definite in respect to the whole; *each* to the units of which *all* is composed.

But when we would speak of the units less definitely than *each* but more definitely of the whole than *all* implies, *every* is used, as *Every man on board the ship was lost.* Again, when parts of a group are spoken of, we use terms which express their numerical relation to the whole as *many* and *any*. They are used indefinitely, as *Have you many books? Have you any books?* or more definitely, as *Many of the books are small. How many books are on the table? Twenty. Have any of them red bindings? Yes, ten.*

Few and *some* are more definite in respect to the numerical relation of the part to the whole, the latter being the more indefinite of the two, as *Are any of the books old? Yes, some—or a few.* They are also used of quantity, as *Some of the hay is spoiled by the rain. A few of the books are damaged.*

Several differs from *few* and *some* in more definitely suggesting a numerical distinction of the units, and its use is clearly illustrated in such examples as: *You see some pieces of wood there. Bring me a few of them. I have several pieces—or, of the pieces—of wood.*

Both needs no explanation, and may be easily illustrated by the teacher.

Another and *other.*—The use of these words should be carefully pointed out. *Have you another book?* is an indefinite question referring to any one book, and in the plural becomes *Have you any other books?* but *Have you the other book?* definitely refers to some one of two or more, and similarly in the plural. The phrases *one another* and *each other* may be practically illustrated by such examples as: *Tom, John and Fred like one another,* but *Tom and John like each other;* and so also in *All the boys like one another* and *Both boys like each other.*

When the part of a group we seek for is wanting, *none* or *nothing* is used, as *Have you any money? No, I have none. What have you? I have nothing.*

In the use of all these adjectives the teacher ought, first, to observe their relation to the whole, and then their special relation to each of its parts. These are the ruling and regulating conceptions in illustrating them clearly.

Comparative Pronouns. Comparison begins with two objects as the simplest form, so that the habit is acquired of looking at things by pairs, and we have several words to specially express the different relations in which they may stand to each other. Thus of two rings we say, *One of them is gold and the other is silver. Which will you have? Thank you, I do not want either. Both are beautiful. Neither is too good for you.* Or of two books, *Give me one of them.* Then, *Give me the other. I will give you neither the one nor the other.*

The Passive Voice. All the verbs hitherto learned are in the active voice, or that in which the subject and predicate express the agent and the action, or a simple affirmation. The order of thought is therefore first the agent and secondly the action; but when the object must first be spoken of, or the order inverted, the verb takes a new form in accommodation to this, and the agent becomes an ablative. This is called the passive voice. Thus, *The horse kicked the groom* becomes *The groom was kicked by the horse.*

Whatever may be the manner in which the passive voice grew into use, it can, for the greater ease of the learner, practically be treated as the inversion of the direct order of the sentence to accommodate it to thought. A pane of glass has been broken by an unlucky boy, and the question follows, *By whom was* *this glass broken?* The answer is, *It was broken by Edward. How was it broken? He broke it with a ruler.* Or else, I strike the table. Now let us think of the table first, and the order will be, *The table is struck by me.* But the agent is often omitted, because it is well known, as *In the volume of the book it is written of me*, for *The prophet has written of me in the volume of the book.*

Let a number of active verbs be thus inverted in the different tenses. As before observed, the verb *to be* is used in all its tenses and moods as the auxiliary of the passive voice.

Intransitive verbs do not admit of change to the passive voice, for there is no object which can be made the agent.

Let this use of the passive be carefully considered, *That house was burnt down last night. Who set it on fire? An incendiary.*

Root Ideas in Language. In teaching language, the end has been already described as: (1.) To put the learner in possession of the names for all common objects; (2.) To put him in possession of the logical order in which they are arranged in sentences; (3.) To enable him to express his own thought to himself and to others. The first might be taught independently, but it would be almost useless—a mere jumble of materials without cohesion or relation. On the other hand, if the logical structure alone, or almost exclusively, occupied his time, then he would lack what the Germans call the *stuff*, or material of thought; and his thinking would be limited to a narrow circle, instead of being as wide in its range as the language. The vocabulary ought therefore to grow with the learner's capacity to use it for the purposes of language. Teach words as quickly as possible, but teach them as parts of discourse. If this could be done by a reading book, it would be well; but if more efficiently by the culture of the reasoning faculties, through the logical development of the sentence, then this ought to be followed systematically.

It is agreed that the principal word of every sentence is the verb, and that from it has been derived nearly all the other parts of speech, and that it usually expresses motion or action. Hence as the verb is the root of most words, almost all the modifications of the primary sense of the verb may be comprehended in one word, *to move.* Such words as *to send*, *throw*, *thrust*, *strain*, *stretch*, *draw*, *drive*, *urge*, *press*, embrace the primary sense of a great part of all the verbs in every language, and according to Max Müller, all our concepts of action may be reduced to 800 roots.

However this may be, it is evident that these concepts are the primary elements of language, and that their possession must put the learner in the most advantageous relation to all the other words formed or derived from them. They are the names of the principal acts, states, and relations of life; and to know them thoroughly must provide reflection with its best materials. They ought, therefore, to be carefully illustrated in the order suggested by the following arrangement; for it has been compiled on the principle, that acts when closely related, as *walk*, *run*, etc., can be better distinguished and named by their associated reproduction; for related acts limit one another till the precise meaning of each is defined. The following list is by no means exhaustive. and may be usefully supplemented by a good list of synonyms, such as Roget's well-known *Thesaurus*.

1. *Action towards the actor.*—Pull, draw, drag, strain, stretch.
2. *Action from the actor.*—Push, drive, thrust, throw, pitch, send, press on, force, spread, scatter.
3. *Action in arresting.*—Stop, stay, arrest, prevent, check, resist, oppose, hold.
4. *Action in striking.*—Strike, smite, beat, whip, punch, poke, flog, buffet, stab, pierce, prick, punish, spear.
5. *Action to destroy.*—Kill, slay, murder, shoot, burn, drown, flay, hang, behead, smother, smash, crush, destroy, annihilate.
6. *Freely exerted motion.*—Go, walk, run, pass on, go by, advance, retreat, leap, fly, spring, bound, trip along, trot, gallop, canter, rush, dance.
7. *Motion on the surface.*—Creep, crawl, slide, skate, skim.
8. *Motion towards an object.*—Come to, approach, draw near, advance to.
9. *Motion from an object.*—Go from, retreat, leave, desert, forsake.

10. *Circular motion.*—Turn, twist, twine, roll, wind, turn round, run round.

11. *Expanding motion.*—Swell, open, germinate, bud, bloom, spring up, flourish, thrive, shoot, grow, burst.

12. *Contracting motion.*—Shrink, contract, shrivel, decay, wither, fade away.

13. *Action on or near the surface.*—Sail, row, paddle, steam, float, swim.

14. *Action below the surface.*—Dive, wade, dip, dredge, fish, plunge.

15. *Suspensory action.*—Hang, suspend, hold up, swing, dangle, cling.

16. *Action in moving a body.*—Shake, stir, agitate, rouse up, toss, tumble.

17. *Action in fastening a body.*—Nail, glue, paste, pin, peg, bolt, screw, lock, bind, fix.

18. *Involuntary action.*—Fall, tremble, slip, shake, quake, shiver, writhe, wriggle, stagger, reel, stumble, trip.

19. *Action in conflict.*—Fight, wrestle, strive together, battle, resist, overcome, conquer, attack.

20. *Action in dressing.*—Dress, put on, don, cover, adorn, comb, brush, pin, button, tie, bind, brace.

21. *Action in undressing.*—Undress, take off, doff, unclothe, throw off, loose, pull off, untie, put off, unbutton.

22. *Action in raising.*—Lift, take up, raise, hoist, snatch, heave up, elevate.

23. *Action of the senses.*—Hear, see, touch, smell, taste, feel, smart, pain, behold, look at, watch, observe, listen, hearken, thirst, hunger, pine, yawn, sleep, awake.

24. *Action causing friction.*—Rub, smooth, scratch, scrape, polish, file, sweep, brush, scour, scrub, grind.

25. *Action causing injury.*—Hurt, bruise, break, crush, squeeze, pinch, bite.

26. *Action in bearing.*—Carry, fetch, bring, convey, cart, import, export.

27. *Action in separating, involuntary.*—Open, gape, crack, split, burst, explode, fly in pieces.

28. *Action in separating, voluntary.*—Separate, pull into pieces, tear, smash, break, rend, rip, cut, split.

29. *Action due to application of water.*—Wash, cleanse, clean, bathe, water, sprinkle, sponge, scald, boil.

30. *Action of heat.*—Warm, melt, smelt, dissolve, burn, parch, roast, broil, singe, fry, seethe, cook, toast, kindle, light, set on fire, liquefy, boil, scorch.

31. *Action of cold.*—Cool, chill, freeze.

32. *Sound produced by man.*—Speak, say, talk, whisper, breathe, groan, sigh, cough, sneeze, snore, cry, weep, lament, shed tears, laugh, moan, stammer, stutter, bellow, roar, hoot, hiss, blow, puff, cheer.

33. *Expressive action.*—Smile, frown, look cross, look sad, look

solemn, look happy, look angry, look proud, look pleasant, look silly, look wise, look foolish.

34. *Action for an end or purpose.*—Try, do, work, make, labour, attempt, strive, endeavour, aim at, begin.

35. *Action in completing.*—End, finish, accomplish, achieve, bring about, succeed, gain, win, attain, arrive.

36. *Action in cultivating.*—Dig, rake, hoe, plough, harrow, drill, sow, plant, clean, weed, dress, manure, cut, reap, mow, bind, carry, stack, gather, glean, thrash, winnow, dry, grind, sift.

37 *Action in cooking.*—Bake, knead, cook, leaven, raise, roast, boil, fry, toast, warm, broil.

38. *Action of the emotions.*—Love, hate, enjoy, rejoice, sorrow, rage, fear, dread, desire, long for.

39. *Action in seeking.*—Ask, pray, beg, seek, entreat, implore, request, urge, invite.

40. *Mental action.*—Think, perceive, conceive, know, understand, judge, reason, examine into, discover, find out, remember, forget, suppose, guess, design, plan, imagine, devise.

41. *Action in producing.*—Weave, sew, spin, knit, net, hem, seam, build, paint. glaze, print, engrave, join, cast, weld, shoe, turn, tin, paper, trim, clip, cut, etc.

To learn these verbs is to do something more than form a vocabulary, or become familiar with words most frequently used ; it is being put in actual possession of the terms by which a multitude of other words can be explained and illustrated, because they are either derived from or synonymous with them. The teacher often finds himself at a loss to explain some new word, and spends time in searching for suitable illustrations, but he will have much less of this if he has already taught these root concepts. They furnish the keys for many more. He should find out, arrange, and teach these words, so that his scholars may, as soon as possible, learn all the essential elements of the language, and so be placed in possession of all that is fundamental in thought and advance to all its developments.

Dr. Fick in *Webster's Dictionary* (1900 Edition) gives a list of 310 roots of the original Indo-Germanic language to be found in the English language, of which 178 are verbal. This list may prove suggestive as a guide to the root ideas of language.

General Remarks. Our treatment of the simple sentence is far from being exhaustive, and intentionally so. This would not have answered the purpose, which was by a series of lessons on the principal parts of speech, to put the learner in possession of such a knowledge of the general structure of language as to enable him to proceed by analogy to the completion of the building by reading, writing, and speaking. Our own experience is confirmatory, for where thought and memory become habituated to a certain order and relation in language they are almost certain, with every fresh addition to knowledge, to be followed from analogy in thinking and speaking. Custom has determined this for those who hear, and it ought to be instituted as speedily as possible in the case of the deaf.

This can be done only by frequent repetition. Now that the vocabulary is increasing, and the reflective power more developed, a revision of the earlier lessons, by the introduction of prepositions and adverbs, which had to be excluded on account of the inability of the learner to comprehend them, and at the same time using other nouns and verbs, would confirm the associations already formed and further increase the vocabulary.

Composition also ought to be encouraged, for our hold on language is never confirmed till it becomes the vehicle of our own thought in speaking and writing. Much, however, depends on the disposition and capacity of the learner. All are far from being alike. Some are timid or nervous. These need to be encouraged, to be lured onward by the interest excited, and then shown the way. Others are dull, almost to stupidity. These want rousing, not by force but by attraction. The teacher needs all his energies to stir and lift up, almost inspire these slow ones, till he succeeds in evoking their latent powers. Others, again, are quick and ready, but capricious ; quick to apprehend, but as quick to forget, they require steadying in order to receive deeper impressions, and to think more closely.

Get them to say what they think about what they see ; to ask questions about them ; to tell you what they saw yesterday or in their walks ; in short, make full use of any incident that excited their attention.

No matter how simple and imperfect these attempts may be, they are a beginning, and enable you to correct their errors and complete the expression of their thoughts. Lead them also to pose one another with questions, for to shape a question correctly implies some conception of the right answer. Let the verb *to be* have as large a space in these exercises as verbs of action, for its use requires a greater power of abstraction.

SECTION II.—THE COMPLEX SENTENCE.

Elements of the Complex Sentence. A sentence is said to be complex when made up of two or more simple sentences. But this does not sufficiently define its logical relations or clearly distinguish it from the simple sentence.

In our treatment of the simple sentence it has been seen how the subject and predicate may be expanded and completed to form an adequate expression of the proposition in its different relations as it appears to the mind of the speaker; and that for this purpose prepositions, adverbs, adjectives and other nouns had to be introduced, by which the subject and the predicate were more accurately described; but it sometimes happens that these additions do not suffice to present the proposition in all its relations and all its parts; and for this purpose other simple sentences must be introduced to complete the meaning. They are therefore only further expansions, and as subordinate to the simple affirmation as the additions already made in its development. But a new proposition or affirmation cannot be treated like an adverbial complement. It has its subject and predicate, which stand in various relations to the principal sentence on which it depends, and these have to be clearly expressed by connecting words called *Conjunctions*, but which are really the words on which the nature and value of the relation depend.

Of these Tarra says, "Though the conjunctions or particles destined to unite two affirmations may be undeclinable and invariable, it is always very difficult to form an exact idea of them, just because they express a particular rational connection between the ideas." "Their use is not very easily learned, for in the verb, and in the construction of the phrase, they imply modifications, which vary with the nature of the relation. Would we confine the language, which is transmitted to our scholars as a patrimony, within the limits assigned by usage, we cannot, in the mean time, dispense with initiating them into the knowledge of the relations between the affirmations and the manner of expressing these relations. Without this knowledge they can, in fact, neither reason nor comprehend reasoning, nor the discourse of another, nor acquire the knowledge of history, religion, and morality which borrow their real rational value from these relations. They are, one may say, the *pivots* of the great mechanism of language, placed in relation to the ideas—pivots fixed and immovable, on which all the wheels revolve—which are bound to give motion to reason in all its spoken manifestations ; the absence of which would only create trouble and bring about a stoppage. Though the reason, in its internal and wholly abstract exercise can conceive these relations among the ideas without knowing the connecting words and the constructions which depend on them, yet it is certain that without these words and these constructions no one would ever be able to make others comprehend his reasons or comprehend theirs." A simple illustration will make this clearer ; suppose I say to a friend, *I met the poor man again to-day.* He may ask for more information, *What poor man?* and I reply, *The poor man to whom you gave a penny yesterday.* The dependent sentence at once enables my friend to identify the man by his own action in having given him a penny, and this relation is expressed by *to whom*, and so the predicate is expanded by the addition of another sentence, thus, *I met the poor man again to-day (to whom you gave a penny yesterday).*

To teach our scholars the complex sentence in all its forms is not so difficult as it at first appears. If the teacher would divide the sentence into its principal and dependent parts, and write it out in such a manner that the dependent sentence, separated from the principal by brackets, appears in a parenthetic form in its proper place, linked on to that part of the subject or predicate of which it is the expansion, he will lead his scholars to perceive the nature of the relation between the propositions; as, *The young man who was here this morning is a doctor*, which may be broken up and re-combined thus,

The young man is a doctor.
He was here this morning.
The young man (who was here this morning) is a doctor.

Here, if anywhere, the rule must be observed, to advance from the simplest to the most complex As Tarra says, "The different kinds of relations existing between the ideas must be classed in such a manner that from the simplest and most sensible the scholar is led up by degrees; and from those which require a more facile construction to those which require a more complicated one."

The learner would also be aided if the teacher at first availed himself of the objects and acts about which he wants more information, or which would suggest the dependent sentences, as, *The sum which you have done is wrong* The dependent sentence may be suggested by asking, *What sum? The sum which I have done.*

Another helpful expedient is to reduce a complex sentence to simple unconnected sentences, as, *The silver coin, which I gave you, is very old. I gave you a silver coin. It is very old.* Let the scholar reconstruct the complex sentence from the simple sentences. But sometimes the relation is so intimate that it cannot be treated in this manner without affecting its meaning.

Grammarians divide subordinate sentences according to their relations:—

(1.) When the noun or noun phrase is expanded into another sentence it is called a *noun sentence.*

(2.) When the adjective to the noun of the subject or object is enlarged into a new sentence it is called an *adjective sentence.*

(3.) When the adverb or adverbial phrase is extended into a new sentence it is called an *adverbial sentence.*

The Noun Sentence. In order to approach the first of these relations of the dependent sentence we ought to consider how we or others stand in relation to ideas.

1. I may tell what I see, as, *I see my friend coming.* 2. I may tell what I think about him, as, *I suppose he is my friend. He wears the same dress and walks like him.* 3. I may give my own reflections about him, as, *Ah! it must be he, for he promised me when here yesterday that he would come to-day.* 4. I may relate what another says or thinks, as, *My brother told me this morning that he heard him say he was coming to-day.* 5. I may call the attention of another to what I see or think, as, *Come and look at this boy climbing up the tree, I think he is in great danger of falling down.* 6. I may command another to go and tell what I want or have seen, as, *Go and tell E—— that I want her. Tell mamma that I have seen Thomas this morning.* 7. I may relate what another told me of what he has seen or thought about something, as, *Mr. C—— told me this morning that he saw a house on fire in the street last night, and he said it was very terrible to see the flames and smoke. Much property was destroyed, but no lives were lost.* 8. I may repeat what I have read in a newspaper or a book, as, *I read in the "Times" of yesterday that a woman was found drowned in the canal. She had lost her way in the fog and fallen into the water.*

Many of these contain noun sentences, for the dependent sentence fills the place of a noun object to the principal verb. But before proceeding to their full illustration and preparing the learner to grasp the whole sentence clearly, it would be better to select some of the simplest connecting words, as *that.* First, as already observed, it is a demonstrative adjective or pronoun, pairing with *this*, and their plurals *these, those.*

Then it is a relative pronoun almost equivalent to *which, who,* or *whom. He (that is industrious) does not lack bread.* Here *that* takes the place of *who.*

It is also used as a noun or representative of a sentence, as, *When he heard that*—something said before —*he went away.*

It is used as a conjunction, but at the same time filling the place of an adjective to the dependent sentence, as, *He said that (he would give me some money to-morrow).*

Sometimes it takes the shape of a relative explanation, as, *Six times four are twenty-four, that is, six added to itself four times makes twenty-four.*

If the learner has a number of exercises framed to exemplify these different uses of *that*, they will increase his power of distinguishing the word according to its relations, but it would be better not to do this till its place in the complex sentence has been taught.

Upon the whole the simplest form of illustrating the noun sentence is first to speak or write a sentence in which a noun is the object, then remove it, and substitute the dependent sentence, as, *What do you read? I read a newspaper. But what do you read in the newspaper? I read (in the newspaper) that there was a great storm in the Channel yesterday.*

The word *newspaper* in the principal sentence is extended by *that there was*, etc., in the dependent.

Again, school incidents provide ample illustrations, as, *Tell T—— that I want him. What did you tell T——? I told him that you wanted him. What did you say to M——? I said he was idle. Go and say to M—— that I want to see her. Well, did you tell her? Yes, I told her that you wanted to see her.*

Such exercises require reflection in the use of the different tenses which exercise the intelligence of the learner.

The teacher is doubtless aware that there is a class of verbs which require this complex form, such as *say, tell, think, suppose, believe,* and that they imply the relation of the actor to another action either expressed or implied, as, *I think there will be a storm to-day.* Here the thinking is one action, and the coming storm another, which is the object of the thinking.

The Adjective Sentence. As this dependent sentence fills the place of an adjective in relation to the noun of either the subject or predicate, it can be introduced immediately after its noun. As the adjective qualifies its noun, so the adjective sentence qualifies the subject or object of the principal sentence, as, *The book (which lies on the table) has a red cover.*

The relative pronouns—*who*, *which*, *whose*, *what*, *whom*, and *that*—are the pivot words in these adjective sentences, but the relation can also be expressed by certain adverbs and prepositional phrases and participles, as *when*, *where*, *wherein*, *why*, *wherefore*, and *how*.

The book (which lies on the table) is mine. This is an adjective dependent sentence, for which a participial phrase may be used, as, *The book (lying on the table) is mine;* or a prepositional phrase, as, *The book, on the table, is mine.* Here *which is* is understood.

Other examples are:

The house (in which we are living) was built by me.
The house (where we live), etc.
The time (at which he will arrive) is twelve o'clock.
The time (when he will arrive) is twelve o'clock.
Put the book on the shelf (where you found it).
Put this book on the shelf (on which you found it).
Pay me the money (which I lent you), or, omitting the relative,
Pay me the money (I lent you).

So also in these:

This is the thing (which I wanted).
This is (what I wanted).

Sometimes the relative is the object of the dependent sentence, as, *The boy (whom you see) is William's brother.* Here *whom* is the object of *see*; but the dependent sentence is adjectival to *boy*.

The flower (whose smell is so sweet) is a hyacinth, or *The sweet-smelling flower*, etc. In the former case the relative sentence is in an adjectival relation to the noun.

These different forms of expressing the adjectival relation furnish the teacher with ample means of illustrating it, but it would be better at first to teach the simple relative relation to prevent confusion. When this has become familiar the other forms can be introduced.

The Adverbial Sentence. This is the expansion of the adverb into an auxiliary sentence.

As the adverb stands in a similar relation to the verb of the predicate that the adjective does to its noun, the adverbial sentence modifies the principal verb.

Its adverbial nature will be found by using an appropriate adverb as an interrogative, as, *I found the book (where I laid it). Where did you find the book? The chair fell down (when you got up). When did the chair fall down?* Here in the predicate *fell down*, the point of time is supplied by the adverbial sentence, *when you got up.*

Adverbial sentences relating to time.—This relation to time may be one of simultaneous acts, as, *Let Tom write while you read.*

Or one act may be antecedent to the other, as, *They had finished their lesson when you began.*

Or one act may be subsequent to the other, as, *We played after you went to town.*

In one of these examples the pluperfect tense is used; better, therefore, that it should be repeated as a whole and well learned.

The second future also may be illustrated in the same manner.

But to put the learner in possession of the precise relation of these tenses, better extemporise them in action, which can be done by two persons or two groups. Both acts ought to be in the past, but the one preceding the other, as, *T—— had said his lesson before L—— came in.*

The second future may also be exemplified in the same way, as, *When we go out to play we shall have learned all our lessons. The sun will have set when you go to bed.*

The duration of time may also be expressed adverbially, as:

I will read while you play. These are simultaneous acts.

Whip your top till I come. The first is antecedent to the second.

When I return you can play. The second is subsequent to the first.

You play in the field as often as the weather is fine. In this the action is repeated.

Adverbial sentences relating to place.—These include rest in a place, motion to or from a place, and occupy an adverbial relation to the principal verb.

(Where thou dwellest) I will dwell. Put the book (where I told you). The wind bloweth (where it listeth). I do not know (where to look for him). The tree lies (where it falls). (Where the bee sucks) there suck I.

Adverbial sentences of manner, number and quantity.—A comparison of some kind is usually implied in these. The objects are equal or unequal, greater or less. *Than, as, so, so — as, as — so, more — than, as — as, less — than,* are employed to express the relation.

Than, as already seen, is indifferent to the greater or less, but is never used of the equal. *This tree is taller than that. That tree is shorter than this.*

As or *As — as* express equality: as, *T—— is as old as J——. The dining room is as large as the drawing room. He does as he always has done. Do as you like. As soon as you return we will go home. As long as I live will I praise Him. This rod is as long as that.*

On the other hand, *not so — as* expresses inequality, as, *This house is not so large as ours. T—— is not so tall as W——.*

So — as implies equality, as, *Is he so old as you said? So be it as you wish.*

More than expresses difference between the greater and the less, *less than* between the less and the greater, and *as much as*, equality.

He has more money than I. We have more fruit trees in our garden than you. J—— is less tall than W——. Do you love your brother more than your sister? No, I love the one as much as the other.

As — so expresses equality. *As we sow so we shall reap. As we make our bed so we must lie. As two are to four, so are six to twelve.*

In the analysis of such adverbial sentences it will often be found that the adverbs used fill the place of a relative pronoun as well as that of a simple adverb, for they not only indicate the adverbial relation of the dependent sentence, but at the same time serve as relative pronouns or conjunctions to connect the sentences. The names of the parts of speech are convenient but not always correct, because they have different functions.

Adverbial sentences of cause.—These express a reason or ground. As the deaf, like everyone else, have a strong tendency to excuse their faults, and as to excuse is to assign a reason, *because* soon finds a place in their vocabulary. Their curiosity or interest in things novel or astonishing also prompts the enquiries *How? Why?* if not in word, in look or manner. This disposition is very much in their favour when learning adverbial sentences of cause.

Because, for. Why have you not learnt your lesson? Because I had no time. Why did you strike Tom? Because he struck me, or directly, *I struck Robert because he struck me. Edward was punished for he was a naughty boy. How was he naughty? He told a lie, which is a sin. Why did he tell the lie? Because he was afraid to tell the truth What was the lie? He stole some of Tom's money, and denied it. The plants in the greenhouse grow well, for they are watered every day.*

As takes the place of *because* in some sentences, as, *As you have not learned your lesson you must stay at home while we go for a walk.*

Why? and *Wherefore?* may now be asked of many things which can at once be referred to, as, *Why does coal give us heat? Because it burns. But why does coal burn? Because it is formed of plants that contain carbon.*

Conditional relation of Complex Sentences. Sometimes the doing of one action depends on that of another for its completion. The relation betwen them is, therefore, called contingent, or the first cannot be or be done without the second. To express this relation the verb has a special mood called the *subjunctive*, preceded by a conjunction or pivot word, which is still more closely descriptive of the relation.

If expresses a contingent relation. *Give me a pencil*, is a demand, but *Give me a pencil, if you please*, a request, for the giving of the pencil is contingent on the will of another. The best illustrations of this relation are found in school life, as, *If the rain ceases, we shall play a game of cricket, but if it does not we shall play in the schoolroom. If you write your exercises well, I will let you see the picture book. Shall we skate to-morrow? If the ice is strong enough. Shall you get a prize at Christmas? Yes, if I learn my lessons well. Will the other boys love you, if you are a bad boy? No; they will love me, if I am a good boy.* These ought to be taken out of the interrogative form and written in the direct, thus, *We shall skate to-morrow, if the ice is strong enough*, etc.

Unless, *except*, express the contingent relation more emphatically or exclusively, as, *Unless ye repent ye shall all likewise perish!* i.e., *If you do not repent*, etc. *I will not let you go except you obey me.*

Unless is another form for *if not*, as in *Unless we sow we shall not reap. If not* can be substituted for *unless* and *except* without affecting the meaning much.

Though, *yet*, concede something in a contingent form to strengthen the principal proposition, as, *I shall go out though I am unwell. I was not well yesterday, yet I went out.*

Whether—or imply two contingencies, as, *We mean to go whether it is fair or foul*, i.e., *If fair, if foul, we mean to go. Whether he is rich or poor we will not leave him.*

Sometimes the condition implies a purpose or object, as, *I will study well that I may please my parents;* or *to please my parents.* This implies: *If I study well I shall please my parents. Why should you think much? That I may learn well We must work, that we may eat.*

Conjunctions The patience and ingenuity of the teacher will be fully exercised in teaching conjunctions. His lessons may be well devised and very appropriate, but they will not suffice for all his purposes. Something more will still be wanting to put the learner in their full possession, and this will be best found in the stirring events of life, which ought to be closely observed for the purpose; or, in their absence, in interesting stories, reports of accidents selected from books and newspapers, which contain the words or phrases to be illustrated, for they supply better conditions than might occur to the teacher in the composition of the lesson, and excite the enthusiasm which stimulates thought and quickens invention.

Such exercises would do much to strengthen and develop the ability to connect the different parts of a narrative, to catch its drift, and to test the correctness of its statements.

The experienced teacher knows full well that his scholars seem to lose hold of the earlier parts or thread of a story, not because memory is so defective, but that the connecting links which bind it into a whole have not been supplied or understood. The conjunctions are these links, and hence ought to be well learned. It is not enough to advance from the beginning and pass on to the conclusion; the conclusion itself ought at times to be made the starting point, and then the story followed sentence by sentence, in an inverse order till the whole is joined like the stones in a wall or the links in a chain. Interrogation provides the best method. Short passages should be specially selected, and made the subject of question and answer till every sentence is mentally connected with all the others. It is not enough to analyse them till every part is supplied; they ought to be re-composed from the answers, and great care taken that the proper conjunctions are supplied, for it is usually found that the failures are chiefly in this direction.

Dialogue is excellent, because it enables the learner to state his own thoughts in his own words on any subject. But more than this is wanted. He ought to be encouraged to observe and narrate events, give his opinions on special points requiring a true and correct judgment, and then tell what others have narrated, and his opinions about it. On account of the intervention of a second party this requires constant mental reference to him as well as the subject. We made a beginning of this exercise at an earlier part of the course in asking such questions as, *What did he say? What did he do?* etc.

Tarra says, "These exercises confirm and extend the idea and the employment of the logical connections. They permit the arrangement, the execution or the relation of the actions and judgments which are therein recounted. They permit the application of dialogue to the objects and the events in such a manner that the scholar can make practical use of the connecting conjunctions. Further, they present the following advantages:—

1. A conjunction being given, to find out and to apply its different uses to the point of view of the observations, the recollections, or the historic and social ideas of the scholar.
2. Two or more propositions can be united by given conjunctions, as when two single propositions are given in order to turn them into a complex sentence.
3. They enable the scholar to reason briefly on a fact or a truth."

But however clear the expositions of the different forms of the complex sentence may be, or however well devised the exercises on them, an element remains, which can only be supplied by the teacher himself to make the relations of these forms so evident to the mind of the learner that he will readily imitate them. This element is his own ability, readiness, tact, and moral control in leading his scholars to seize and apply the illustrations suggested by the very circumstances and influences under which they are living at the moment, in the forms best known or most likely at once to articulate them into propositions. To lead, direct, and fix the attention on the precise point, and then to illuminate it by stirring action or recital, is his highest art,—more than art, inspiration or magnetic power, if you will—by which he calls into exercise the very laws of thought under which he is himself operating.

SECTION III.—THE COMPOUND SENTENCE.

The exact difference between the complex and compound sentence is that the latter contains two or more principal sentences co-ordinate with each other.

Co-ordination may mean standing in the same rank or degree and not in a subordinate relation to something higher or lower. There is one leading proposition, which the others are intended to limit or expand, illustrate or correct, else their union is of no logical value, but on the contrary tends to obscure and distract, rather than concentrate, the attention on the main topic. In the complex sentence, the dependent part finds its *raison d'être* in the principal, but in the compound sentence, although this subordination does not exist, yet there is, and must be, to serve the purposes of logical association, not only a relation of concomitancy, but also of support and expansion to the leading proposition. A compound sentence forms a unity as well as a complex, but its parts are all of the same rank.

In teaching compound sentences the main proposition should, therefore, be first clearly ascertained, and the relations of the other co-ordinate propositions to this will be readily perceived, for though informal, there is an intimate association, as, *The wind increased to a gale, the sea rose mountains high, and many a good ship was lost.* These three sentences are co-ordinate, but they unite in describing how the ships were lost. The conjunctions used in such sentences imply addition, as *and*, *moreover*, *furthermore*, *the one and the other*, *the former and the latter*, *both—and*, etc. In *The day dawned and the lark rose*, the two parts are co-ordinate and yet the rise of the lark depends on the dawning of the day. So also in *The sun rose and the darkness fled away*, it is implied that the latter is really an effect of the first.

The relations of compound sentences are 1, Copulative; 2, Disjunctive; 3, Adversative; 4, Conclusive; 5, Assigning an effect or consequence.

Copulative Co-ordination. In the progress of connected thought, one proposition often follows another as a simple addition, not by chance, but as a part of a statement of facts witnessed by the narrator, and succeeding in the order of time; as, "David went up by the ascent of the Mount of Olives, *and* wept as he went up; *and* he had his head covered *and* went bare-foot; *and* all the people that were with him covered every man his head, *and* they went up weeping as they went up." This is a simple copulative relation, in which every sentence finds its place in the picture of the manner of the king's departure. Little children usually think in this manner, for they are incapable of understanding complex relations. Their letters abound in *and.* The deaf resemble them, and ought to be led on from the simple to the complex. Better then to take illustrations from familiar objects. The principal thing is to get them to grasp the copulative relation.

Fetch five pencils and lay them on the table Two and two are four, and three and three are six. It rains and it blows. The sun rose at six this morning, and set at five this evening. These examples, with many more already learned, teach the meaning of the conjunction *and*, for it is learned, as in fact all the conjunctions are, not by definition, but by use.

Sometimes several subjects have one predicate, which are united by *and*, as, *T——, J——, and W—— played at cricket.* Sometimes, also, the predicate is followed by several different objects, as, *He sold his house, furniture, books, horses, and dogs.* The *and* ought to be supplied at first to each of these subjects and objects, and afterwards removed and the use of the comma, except in the last, taught. This should be shown on the blackboard.

Also expresses the closest relation between the sentence and that which precedes it, as, *Learn your grammar well and also your geography. If you are here at eight, I shall be here also. Where your treasure is, there will your heart be also.* In these it is more adverbial than conjunctive. *Too* expresses this relation less forcibly, as, *I was there too.*

Likewise, or *in like manner*, is almost identical with *also*, only resemblance in the form is more fully expressed. *He is a good musician, likewise an excellent painter. They slew all the men, likewise all the women and children.*

Besides—by the side of, and *Moreover—something in addition.* The first denotes that some relation exists between what has been said, and what is about to be said. After stating several things descriptive of an object, or relating associated actions, *moreover* expresses an important addition to be made to them.

Their difference from *and* is more apparent than real; yet usage does not permit one to take the place of the other in certain relations. There is a literary propriety or fitness which rules their introduction, as is well seen in the Bible.

Both—and. The meaning of *both* is two, or the one and the other, and is used of persons and things when closely related, as, *He is both wise and good. Wisdom and goodness are both united in him. I both love and admire him.* In this example *and* follows *both* as its complement. *Fetch two maps; put both on the table. He sent T—— to Northampton and W—— to Kingsthorpe; both returned at the same time. The spade is in the garden and the rake in the cellar; fetch both.* In these *both* is a pronoun, and in teaching ought to be referred to each of its antecedents as uniting them closely.

Disjunctive Co-ordination. This means that though formally related, the propositions are diversely or in some sense negatively opposed.

Either—or, express an alternative relation, as, *Whose pen is this? It is either T——'s or J——'s. He is either a fool or a knave*, i.e. if one of these is true the other is not. *T—— is either poorly or pretending. It is so very cold that it will either rain or snow. There are two books on the sofa, give me either* (pronoun). Here *either* is used for one indifferently, as also in *On either side of the river.* Its use in these last two examples is not disjunctive. *Either he is talking or he is pursuing, or he is on a journey, or perhaps he sleepeth. Either* refers to each of these, but the alternative relation remains. *Or* implies *other.* If the concept of an alternative relation is well grasped, the different uses of both can be fully illustrated.

Neither—nor, i.e., *not the one—not the other.* These are simply the contraries of the preceding *either* and *or*, and as these affirm one of two to be true, those exclude both. *He is neither a fool nor a knave. He is neither poorly* *nor pretending. Here are two books, give me either. No, I will give you neither. He has neither stolen nor lost the money.*

If the sentences were separated, as, *He is a knave, He is a fool*, the learner can be led to see that the person cannot be both, but one of them, and this would show him the reason for the construction. They are both capital mental exercises, for without reflection they cannot be understood.

Adversative Co-ordination. When one proposition asserts something and another denies or opposes it, this is called adversative co-ordination.

Not.—The strongest term of negation is *Not* or *No*, because it wholly excludes the affirmative proposition. We cannot say at once he is a good man, and not a good man.

But.—The ordinary conjunctive use of this word is seen in *I will tell you what Tom said, but you must keep it a secret.* In one of its uses *but* is a participle (excepting, besides, unless), and this ought to be carefully distinguished from its conjunctive sense, as, *None but the brave deserve the fair.* i.e. *None except*, etc. It is also used instead of *only*, as, *He has but five shillings. But few are happy.* There is an understood antecedent sentence, *Many are miserable, few are happy.*

But also serves to supply what is wanting to the completeness of the former proposition, as, *The rain is falling, but the sun shines. He is poor but honest. You are clever, but not thoughtful.*

In these and other complex sentences, in which the adversative relation is sufficiently suggestive, the parts might be written out, and the space left vacant for the conjunction, which the learner ought to supply, as, *You have a slate . . . . not a pencil. The clouds are heavy . . . . it does not rain.* But to avoid a mechanical supply of the right word other forms of the complex sentence should be mingled, so that reflection only can be exercised on the relations.

Only is sometimes used to give special force to *but*, as, *He tried to mend the rent, but only succeeded in making it worse.* More commonly it is used in limiting number, quantity, quality, etc., as, *Have you much money? No, I have only five shillings. He had an only son. He is only poorly.*

Yet, like *but*, is used to supply something that is wanting, that is over and above, or the contrary. Time is often implied in *yet.*

Many never think about God, yet He provides for them and protects them. He is very poor, yet he aids others by kind words and good deeds. The widow took meal out of the barrel and oil out of the cruse every day, yet neither failed.

Still is closely allied to *yet*, but implies the prevalence of the opinion or condition of the previous states. As an adverb it means *always, till now, continuing.*

After all you have said against him, I still think he is a good boy. What? Are you still idling? He still keeps playing. See if T—— is still in bed. In these last examples *still* is an adverb of time.

Conclusive or Illative Co-ordination. When the second of two sentences stands in such a logical relation to the first as to express an inference from it, this is an illative relation. This is the best use of the compound sentence, for it indicates the highest efforts of reason in searching after causes and effects. As in the simple sentence qualities are compared and the difference stated, so here facts are compared and their efficient relations stated.

Therefore and *Because.* The use of these words is well seen in such examples as, *The shadow of the earth seen on the moon in an eclipse, is round; therefore the earth is round. Because he is poor he is despised;* or, *he is poor, and therefore he is despised. A is equal to B, and C is equal to B, therefore A is equal to C. We live because God lives. He was sentenced to death by the judge because he shot a poor old man. The judge was just, and he therefore inflicted a severe punishment.*

Consequently, as, *He never told a lie, and consequently every one believed him. You went out without your overcoat in the rain, consequently you caught cold.*

A reason or cause is expressed by *since*, as, *Since you will not hear me I must depart;* i.e. *seeing you will not hear me*, etc.

Analysis. The knowledge of the complex and compound sentence in all its forms and relations prepares the way for its analysis in composition, so that the logical relations of all the sentences in a composition to one another can be exhibited, and the subject fully comprehended. Till this is achieved, it cannot be said that the learner's knowledge of language, as the instrument of thought, is complete. This, then, is the practical outcome of the whole process, and the test of his ability to think clearly in the language of articulate speech. The analysis ought therefore to be applied in harmony with the leading principle on which the method has been based—*from the simple to the complex*—so as to form a series of practical illustrations or praxis of all the forms of the sentence already taught, such as grammarians usually provide, only collected and arranged in the order best suited to the capacity of the scholar and the extent of his vocabulary. To facilitate this exercise the following suggestions are made :—

1. Let the whole passage be carefully read over, and every difficult word fully explained, so that the learner can grasp the full meaning of each sentence without stumbling or uncertainty.

2. Let the principal sentence—which all the others are only intended to illustrate and enforce—be ascertained, and placed first in order.

3. Then let all the dependent sentences be written underneath, in the order of their occurrence.

4. The pivot words, or conjunctions, relatives or adverbs, which unite these sentences to one another, should then be set out, and their relations to the principal sentence clearly shown.

I hope that we shall have a fine day to-morrow, for the clouds are red in the west.

I hope. Prinicpal sentence.

(that)	*We shall have a fine day to-morrow.*	Dependent sentences.
(for)	*The clouds are red in the west.*	

The first dependent sentence has for its pivot word *that*, which connects it with *I hope*, of which it is the substantive object, as it completes what is hoped for.

The learner will understand this relation from having studied the complex sentence. *For* is the pivot word which connects *The clouds are red in the west* as the ground or reason for the hope, and therefore stands in the relation of an adverbial sentence to the principal sentence.

This will suffice to illustrate our suggestions, and the teacher would do well to write it out—after pronouncing and letting his scholars repeat the whole passage—on the black-board, and make the connection of its separate parts evident to their eyes by appropriate connecting marks. These will assist in showing the close association which they have with the principal sentence, and so the whole will be comprehended. By numerous exercises of this kind the mental power of uniting related thoughts to each other will be so fully developed that the learner's own thoughts will begin to fall into the same relations, and his compositions be shaped accordingly.

Derivative Words. As already seen, there are principal words, not roots in the etymological sense, but names of things and actions from which others are derived; and these derivatives are known by their terminations, which are limited in number, and easily remembered, as *Print* (noun or verb), *print-ed* (adjective) *print-er*, *print-ing* (noun or adjective); *Pró-duce*, *prodúce*, *produc-ed*, *produc-er*, *produc-ible*, *produc-ing*, *produc-t*, *produc-tion*, *produc-tive*, *productive-ness*, *productive-ly*.

These furnish examples of some of the commoner distinguishing terminations, and they, with some others, are used throughout the language as signs of like meaning. It is therefore very desirable to make the scholar acquainted with each by suitable exercises, so that he may be able to use each derivative word in its proper sense when he knows the principal word, and this can easily be done by sentences in which each such word is in its right place. In some dictionaries derivative words are arranged under their principal words.

CHAPTER III.—PRACTICAL APPLICATIONS.

A knowledge of many words and the logical construction of sentences has been gained by the series of lessons suggested in the preceding chapter. Language, as spoken, has become the instrument of thought, and the vehicle of knowledge. But the field is limited, because the vocabulary has been chiefly confined to lessons framed of the simplest names and incidents. Could the deaf hear the voices of the many around them confirming the old and introducing the new, the number of words and illustrations of forms would have been greatly increased; but in their absence, and to supply the consequent deficiency, recourse must be had to auxiliary lessons, in the form which will best increase knowledge and language at the same time.

A graduated series of reading lessons should be constructed, not in advance, but following the lessons in language, by which they could be still further illustrated, repeated, and confirmed. At first they will necessarily be in the simplest words and forms of construction according with the language lessons, without making too great demands on the time and attention of the learner in explaining new terms. They ought to be interesting and amusing as much as instructive. In fact, they ought to supply the stimulus which whets curiosity and satisfies expectation. They ought also to be well illustrated by pictures, when the subjects are not to be seen, and fresh names explained in words already known by the learner.

Whatever is best fitted to supply the deficiency caused by the loss of hearing ought to be provided in the reading book and the *vivâ voce* lessons of the teacher. Family and school life, the newspaper, the weather, birds, insects, flowers at hand and in the fields, with cattle, sheep, horses, and all kinds of farm labour, supply much to interest and instruct. As language brings the minds of hearing children into close contact with all these objects, so that they think and talk naturally about them, so have teachers of the deaf to do the same service in providing the same language for them.

But there are other auxiliary lessons that can be introduced with the advance of the scholar which will increase both language and knowledge.

Number. In addition to what has been already said about teaching number, it may be remarked that little children, from the circumstances of life, soon learn to count. At first they treat all numbers as concrete, or associated with objects; but in time they are thought of in the abstract, or simply as numbers. It is for us to find words to express these numbers, and playing with our scholars, lead them to repeat the sentences in which they occur: as, *I have one*, *Tom has three*, *William won four*, *but James lost four;* and so on, till words take the places of the mute gestures previously used. From the close attention and clear thinking required, numbers are a good preparation for clear thought, and naming of other objects and actions. We should, therefore, begin to teach numbers as soon as the scholar can articulate their names. They often learn them without speech by usage, or by the things themselves as signs. Better, however, to displace these as soon as possible, and prevent their mechanical use, by the spoken words. We usually say at first, *Twice four are eight,* and prove it by adding the units so as to have them all in our mind; but we soon drop the process, and simply say, *Twice four are eight* as a matter of memory only, and thus save much time and thought; but children who use signs only are ever repeating the process on their fingers or by strokes. Hence the advantage of an oral method of learning number.

History. History furnishes much useful and interesting material for auxiliary lessons. But at the stage in the education of the deaf when it could be introduced, any attempt to teach chronologically would be out of place, for the many dry details would excite no interest. What should be done is to make a selection of the great events and moving incidents of ancient and modern history, connecting the date and king's reign with each, so that they may be made land-marks, with which, in process of time, events of less interest might be connected.

Short lessons could be written on each of these great events, in which many opportunities would be found to teach language by introducing and illustrating new phrases and forms of expression.

At a more advanced stage, when they become better acquainted with books of history, it will be found advantageous to get the scholars to write their own accounts of special historical events. A few leading questions will help to suggest to them the line to follow.

Geography. As history without geography would be incomplete, maps should be freely made use of to find the places, as well as any available illustrations, to give some idea of them. The house, garden, fields, hills, and streams being already known provide the elements of geography, and we can plan or map them while we teach their names, for drawing helps much to fix and define floating ideas.

To begin with geographical definitions would only be a waste of time. These will be in place when the natural features themselves are either seen or delineated in pictures. The teaching of geography, in fact, should be based on the physical features of the world, with the aid, as far as possible, of any local features that are available, or—in their absence—of good models and pictures. The relations of the different features to one another should be clearly pointed out, as those of valleys to hills, rivers to valleys, rivers to seas, and so on, and these relations explained on a good physical map, with the aid of sketches on the blackboard.

Thus, instead of attempting to describe the globe, its seas, continents, and lands, some of its most striking scenes and features should be selected, as the Alps, covered with snow and glaciers, the birth-place of rivers; Vesuvius, pouring out smoke and streams of lava ; the falls of Niagara ; some great lake ; a storm at sea ; a sand-storm in the desert ; and, making a lesson of each, their places on the map pointed out and sketched.

These should be our first lessons in geography, and will establish a real and intelligible connection between the geography of nature and that of books, and so enrich the vocabulary of the scholars with many new names.

The connection of the physical features with political geography, such as the positions of the great capitals of the world, will then become better understood.

A visit to some good museum would not only interest and instruct, but also help to show the intimate connection between the products and manufactures of each country and its natural characteristics of climate, physical features, etc.

The learning of geography is much aided by drawing. Maps give the divisions, boundaries, mountains, rivers, etc., of a country, and these can all be copied in outline, and thus aid in cultivating the ability to localise a place and know something of its surroundings, so helpful in reading or conversation.

Drawing. The value of the art of drawing has become so self-evident that is hardly necessary to do more than urge the necessity of the deaf acquiring it, the more so as it provides a most excellent means of training the eye to an accurate perception of form and its beauty, and of cultivating a habit of exact observation.

Natural History. The great partiality children have for animals suggests them as excellent subjects for auxiliary lessons. It is enough at first to describe their forms, their habits, and modes of life. A visit to a menagerie will prove a stimulating aid in this direction. But any of the many excellent works or charts of Natural History will be equally useful, and should be amongst the most indispensable of the means at the teacher's disposal. Animal life provides abundant material for language lessons.

Grammar. The utility of teaching grammar to the deaf has often been questioned, and in many schools is practically ignored. The reasons assigned for this are: first, that it is really unnecessary, since if the scholars are so well instructed in the language that they can read, write, and converse freely in it, nothing more is required; and, next, that the time spent in learning grammar could be better employed in the acquisition of general knowledge. These reasons are founded rather on a want of time than on a want of estimation of the utility of grammar. It is quite true that a fair knowledge of language can be obtained without its aid. But this does not suffice if the deaf are to enjoy the same advantages of education as the hearing. No one talks of dispensing with it in the education of the latter. Its great value is admitted in teaching the logic of language, and the greater command over its elements obtained from knowing their exact meaning and relations. And if this is true for those whose acquaintance with their vernacular has been acquired naturally and enlarged and strengthened by reading and constant social intercourse, it must be still more so for the deaf, who are almost wholly dependent on the exercises of the school classes for what they learn of it. For it cannot be said that their intercourse with others is likely to help them very much; and, still further, it must be admitted that no course of lessons, and no reading books can altogether supply every element necessary to a fair knowledge and command of the vernacular.

But the study of grammar will not only revise and elucidate all that has been previously learned, but supply many words and forms which could not find a place in a first course. In reality, it gives the teacher the opportunity—from the greater knowledge of language now possessed by the learner—to explain and illustrate what, from the poverty of his resources, he could not attempt before. He can now deal with language as with arithmetic, and show the reasons for the relations in which the various parts of a sentence stand to one another. Or, in other words, it carries forward the mental development for which language is pre-eminently adapted. And, further, if any other language has to be studied—either ancient or modern—then a knowledge of the grammar of our own is the best preparation, for there is much that is common in the structure of all languages.

On the method of teaching grammar there is much room for different opinions. Usually it is applied to language as a set of definitions illustrated by examples, and to be learned apart from its use as the instrument of thought and intercourse. Nothing can well be more uninteresting or impose a heavier tax on memory. No need to teach it in this manner to the deaf. There is a better way within their reach in the method by which they have learned language. Here the simple sentence is the foundation, consisting, as it does, of a noun and a verb, which can be taught at first, not by definition, but in their relation as the subject and the action, naming them according to their import. If this is done with a few familiar sentences, the learner will soon find out that *noun*, and its substitute the *pronoun*, mean any subject, and *verb* any action or affirmative word. The definition can afterwards be more formally stated when its meaning is made clear by the exercises. In this manner should we gradually proceed in the language lessons, till the compound sentence could be analysed grammatically. There is interest and vitality in this method, for it is founded on the principle that language is the expression of living connected thought, and grammar its formulated logic.

Professor Lloyd Morgan, in his *Psychology for Teachers,* well says, "Little need be said on the value of grammar, composition, and the analysis of sentences. But we should not begin to teach grammar too soon; nor should we make it an exercise in mere memory-work, with rules, lists of examples and exceptions, all learnt by heart. When the child is already tolerably familiar with the use of his own language, and is sufficiently developed to be able to perceive the relations of the words to each other in a sentence, then, *starting with the sentence*, *not with the grammar book*, we should train his powers of perception of these relations. And an admirable field for the training of perception it is. When these relations have been perceived in a great number of particular cases, we may lead the pupil on to generalise these perceptions, to conceive the relationships, and to apply the conceptions in particular cases. In this way parsing and the grammatical analysis of sentences may be made a real and very valuable mental discipline. The child should not be allowed to see a grammar until his powers of grammatical perception are such that he is beginning to have complete confidence in them, nor until he has reached, under due guidance from the teacher, a number of generalisations for himself. Then he may use a grammar, but even then chiefly as a book of reference. Composition may be used as a means of exemplifying what has been learnt in the study of grammatical analysis. But just as the child should be encouraged to see that language is not only a medium for the perception of grammatical relations, but a medium through which emotional tone may be evoked ; so, too, he must be encouraged to use language in composition to a similar end. He should be encouraged to develop that appreciation of literary form which characterizes the best use of language, and to express himself in a form that is at any rate not awkward, slipshod, or incorrect."

Reading. On the whole, nothing contributes more to the acquisition of language than the formation and encouragement of a habit of careful reading of anything that is suitable to the scholar's capacity and likely to interest him. It is not necessary that he should fully understand all that he reads, so long as he comprehends the general drift. Reading should, in fact, in his case, be treated more as a recreation and too much in the way of explanation should not be attempted, else it will defeat its own end. In reading, he is insensibly and gradually assimilating numerous forms, phrases, and idiomatic expressions, which remain in memory as integral parts of language, and the meaning of which he will often seize and divine in a way he would not otherwise do, although their full purport and proper use may only be fully understood at a future time. Such a fact indirectly has a great influence in facilitating composition by the freer use and greater command of language which such reading encourages. Of course it is not every one of the deaf, any more than the hearing, who possesses the capacity to mentally assimilate his reading as he does his food, but such a capacity, when it exists, aids him to a much greater degree than it does the hearing person.

With the same object in view, we would recommend that the deaf scholar occasionally commit to memory short poems of a simple character, such as "We are seven," "I am monarch of all I survey," etc., which should then be orally repeated in the presence of the teacher. Such poems abound in those idiomatic forms of language which it is so desirable our scholars should be possessed of. They will recur to memory when the necessity arises of using them in composition, and habituate the scholar to think and express his thought correctly. The writer speaks from experience in urging the value of copious reading and the learning by heart of poetry.

The Lesson. The knowledge contained in the auxiliary lessons described may be taught either by conversation or by lessons written, spoken, and explained, followed by appropriate questions. Could it be done by conversation or dialogue it would be much better for the learner, from the free use of language which it necessitates, and its close approximation to the manner in which hearing children are taught. But every teacher is not prepared with the matter and the forms of expressing it which are required by this method, and therefore he must be prepared with the lesson, and confine himself to its illustration and analysis. There are two forms in which the proposed lesson could be presented: one in which it is printed or written out, and the other in which it is used by the teacher as the matter of the conversation he holds with his scholars. The latter has considerable advantages over the former, for it affords a good exercise in composition to write out the lesson in detail on the slate or the blackboard when it has been made the subject of oral instruction. Speech has thus the primary and writing a subsidiary place. Scholars taught in this manner have to depend much more on speech and memory, and it is therefore a better mental exercise for them.

The form in which the lesson is prepared and written out is that used by most teachers of the deaf. The question, What shape should it take? is one to which some of them find it difficult to give a satisfactory answer. But it may be said in a word that the matter of the lesson determines its form. It may be descriptive of objects, persons, scenes, and events then present, or pictorially represented. All the exercises in language, exemplified in the exposition of the logical method of teaching it, furnish the materials for such lessons. They have only to be applied in a full description of the whole object or event, instead of only one of its parts, as suggested in the remarks made on auxiliary lessons. There is never any lack of matter. The abounding life about us, with all its objects—such as animals, plants, etc.—seen at the time provide it. One can be selected and made the subject. This ought to be treated in some kind of order, and according to the relative importance of its parts, since it is a unity, but made up of parts of major and minor importance. Loose sentences about this or that part would do little for mental training, compared with a proper mode of description, which prepares the way for dealing with the object as a whole, in which all parts are related.

Events that have occurred within the range of our scholars' knowledge, and have already excited some interest, or incidents in their own lives which are well remembered, can each be formed into a lesson. The most stirring events reported in the newspapers or in books might also be fitly told, and form a series of lessons in which geography, natural history, and personal characteristics would have their place. Maps and pictures, if available, ought to accompany them, so as to make the account more definite and real.

Many most instructive lessons, too, could be framed out of the events and anecdotes of history, which would aid much in the moral and religious education of the scholars. If they could be led, after learning them well as a lesson, to recount them in their own words, it would advance their progress in language.

We have seen how history might be made to serve the purpose of acquiring language as well as knowledge. To carry the same method further a passage should be selected from some work, and made the subject of a lesson ; then, after analysing it and explaining all its new names, it might be reconstructed by the scholar out of the matter supplied by the analysis without reference to the text, till it is completed. This enables the teacher, by comparing the forms, to mark and show the scholar the points of composition in which he has erred or failed, and the reasons for them. These are good exercises for the more advanced scholars.

Lessons on the use or purpose of any instrument, tool, article of furniture, or machine, might be framed, in which this should be first stated, and then all that follows should describe the materials and parts, and the mode in which they are constructed for this purpose. The use of a knife is to cut, and there would be no difficulty in showing how all its parts contribute to this purpose. Such an exercise would aid the scholar much in connecting his ideas, finding out the meaning of complex relations, and grasping the subject in its unity. Causes, effects, and natural laws, might well be treated in the same manner, and so introduce science.

When a fable or anecdote is told to exemplify and impress some moral law or religious truth, as the subject of a lesson, the moral should be first orally stated and written. Then, in the progress of the lesson, the points that most explain its terms ought to be at once referred to it, so that it may be fully elucidated. Abstract terms are best taught in this manner.

Some teachers think that instructive exercises could be made of sentences or passages in which omitted words had to be supplied by the scholar. But his vocabulary and knowledge of construction must be considerable to make them profitable. Better to begin by omitting the principal words of a sentence, as the noun or verb, and from these advance to all the other parts of speech in the order of their importance, ending with the conjunctions or pivot words. Such a process would subject the sentence, either simple, complex, or compound, to close examination and revision.

Foreign Languages. The study of a modern language, such as French, where practicable, and when he has made sufficient progress in his own, would be useful to the deaf scholar, not so much for utilitarian purposes, but as a means of exercising and testing his capacity to use his own language freely. This is effected by the constant interchange of forms which having to translate from one language to another necessitates.

[REFERENCES.—As far as the writer knows, there is no English work which deals exhaustively with the subject of this Book from its special standpoint. There are a large number of books —both English and foreign - of graduated language lessons, some of which are good ; but it would be invidious to particularize them here, and this is the less necessary as the teacher will hear of them in the course of his work. Arnold, in the original edition of this work, specially mentions J. Vatter, *Der Verbundene Sach- und Sprachunterricht*, Frankfurt a. M. To this may be added J. J. Valade-Gabel, *Methode a la portee des Instituteurs primaires, pour enseigner aux Sourds-Muets la langue Française sans l'intermediaire du langage des signes,* Paris, 1857 ; in regard to which M. Dupont, Professor at the Paris Institution, informed the writer in a letter, that "his method in the theoretical part is altogether incomparable." A reprint of this great work is promised. Walther, *Handbuch der Taubstummenbildung,* Berlin, 1895. The *American Annals of the Deaf*, and other leading foreign periodicals contain good articles on the subject.

Of outline Courses of Instruction, special mention may be made of that prepared and issued in 1900 by Messrs. Jones and Patterson (of the Ohio Institution) as one of the most complete and comprehensive.]

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CORRIGENDA ET ADDENDA.

Page 51. Line 4 from bottom, *for* "At one time . . . . Paris," *read* "Successively teacher in the Paris Institution, head of that at Bordeaux, and Inspector-General . . . . ."

Page 97. The statistics were taken from the *American Annals* for January 1901. In the next number —that for March—the following corrections were made :—
line 16 from top, *for* 4703 *read* 5703.
line 26 from top, *for* 5687 *read* 6687.

Page 135. *Speech.* In reference to sound as a mode of expressing language, Arnold well observes that "somehow it does not resemble either signs or letters, for it introduces neither shape nor motion, but takes the thought into itself, so that they seem connate. It cannot be portrayed or reduced to any imaginary shape; it is felt but not seen, and this gives a unity to the language of speech which makes it pre-eminently adapted to the expression of thought and the mental use of words." From its being in another connection, this passage was overlooked.

Page 235. At end of line 11 from top, *add* "*nasals*, m, n, ng."

Page 244. To the references to the sound *ä*, *add* "page 239."